JPRS-EST-86-031

28 OCTOBER 1986

Europe Report

SCIENCE AND TECHNOLOGY

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EUROPE REPORT

SCIENCE AND TECHNOLOGY

WEST EUROPE

/9987

WEST EUROPE/ADVANCED MATERIALS

BRIEFS

DUTCH FIBER FIRM DELAY COSTLY--Arnhem, September 18--Dutch chemical group Akzo stands to lose millions of guilders due to protracted delays in starting production of its aramide fibre "Twaron,' its Enka subsidiary said today. Production of the super-tough fibre was to have begun in March, but technical difficulties resulting from a cold snap last spring which damaged installations at Enka's Delfziji plant have delayed the start-up until the end of the year, an Enka spokesman said. The first experimental deliveries of 'Twaron' will take place next month, for full commercial production in late November and December. Repairs to the raw materials plant took longer than the estimated six to eight weeks, delaying production of the fibre at a second Enka plant in Emmen, the spokesman said. He said it was too early to assess the full extent of damages, as these were not solely due to repair costs but arose especially from delays in starting up production. Akzo's super fibre will compete with a similar aramide marketed by U.S. chemical company Du Pont de Nemours for some years in the Netherlands under the name 'Kevlar.' The Enka spokesman said it was unlikely Akzo had lost customers due to the late start up as it still had to enter the market. [Text] [The Hague ANP NEWS BULLETIN in English 18 Sep 86 p 3] /9317

CSO: 3698/17

WEST EUROPE/AEROSPACE

FRG AEROSPACE INITIATIVE, ALLIANCES REVIEWED

Paris L'USINE NOUVELLE in French 16-21 Aug 86 pp 22-24

[Article by Jean-Pierre Casamayou: The Germans Come Up Fighting]

[Text] The German aeronautics industry is restructuring and consolidating to meet the industrial challenge of its European competitors. In order to gain new markets, it is increasing its joint ventures in the United States and, to a lesser extent, in Latin American and Asia.

The German aeronautics industry is no longer hiding its ambitions. "Our objective is to equal France and England in the aeronautics field," stated Otto Greve, president of Germany's BDLI [Federal Association of German Aerospace and Arms Industries]. On the technical and technological level, this objective has already been reached, but industrial capacity still falls far short of the mark. With 79,000 employees and a business volume of 45 billion francs, the German aeronautics industry has not yet caught up with its British and French counterparts. To reach this goal, the Germans are banking on joint ventures around the globe. Their narrow domestic market makes this approach necessary. Moreover, the only 100-percent domestic products are one type of helicopter and a small transport aircraft. Initially, emphasis was on ventures with the United States and Europe. Among other advantages, these alliances made it possible to avoid export restrictions on military hardware. Today, German engineers are focusing on farther horizons: South America and Asia.

The other growth acceleration method is based on restructuring--by concentrating the means of production. Thus, the Daimler-Benz group has absorbed the Munich engine manufacturer MTU and taken over Dornier and AEG for good measure. Mercedes resources (last year's profits totalled 4 billion francs) will be most useful to these companies, which spend 20 percent of their gross income on research and development.

MBB Projects in Asia

MBB (Messerschmitt-Boelkow-Blohm), the other major German aerospace concern, may also apply to a large group. So far, Franz Joseph Strauss, the president of the state of Bavaria, has been unsuccessful in his efforts to marry MBB off to MBW and Siemens. The transaction is a difficult one. The northern

owns that hold stock in MBB--such as Bremen, which has just bought out Krupp's share--may oppose such a union, which would favor Bavaria.

However, the Bavarian aircraft company has other worries. It needs to launch the two new Airbuses--the A330 and the A340--for which the German government has just released 600 million francs. MBB manager Hans Vogel intends to take a predominant part in these two programs. He would very much like to build the new variable camber wing, and even take charge of final assembly. He is hoping that these two aircraft will make up for decreased work on the A320. He has also acquired a 27-percent share in the Dutch Fokker F100 twin-engine jet in order to avoid being too closely tied to Airbus.

At the same time, MBB has begun study on a medium-range aircraft for Indochina with Boeing and has undertaken a ductless fanjet project with the Chinese. This last project is important for MBB, since it would give the firm its first chance to act as prime contractor on a major aeronautics program.

Asian alliances also characterize MBB's helicopter activities. These include a joint venture with Kawasaki in Japan for the BK117; with Nurtanio in Indonesia for the NB109; and, recently, in India. These cooperative efforts should make up for the weak demand for the B0105, the only helicopter made by West Germany. With 1,100 copies, the B0105 is reaching the end of its career, and the best hope of using surplus production capacity lies in getting the stalled French-German combat helicopter off the ground.

Blue Skies at Dornier

The combat aircraft situation is just as tricky. When the Tornado program ends in 1990, more than a third of 929 copies produced will have been built by MBB. Since exports are apparently not doing as well as expected--despite the Saudi order for 72 aircraft--bridging the gap until the future EFA fighter goes into production will be difficult, especially given the project's problems: the British, Italian, and Spanish partners still have not agreed on the technical specifications. In addition, Fantrainer, the small trainer aircraft, appears only to be successful in Thailand (47 copies) and, possibly, with the Luftwaffe.

In contrast, skies are blue at Dornier. The Daimler-Benz takeover and the arrival of Johann Shaeffler as chairman of the board have cleared up a situation clouded by fighting among family shareholders. As a result, the former Airbus Industrie general manager can now play his hand in relative peace. He would like to acquire a 7.6 percent participation in Airbus, even though Dornier is only a program subcontractor.

Dornier's pride is still the D0228 regional transport aircraft, the only 100-percent German airplane. With over 100 copies sold, it is currently manufactured at the rate of 4 copies a month and has been licensed for manufacture in India. So the civilian line should make up for the production halt on Alpha Jets, built in cooperation with Dassault. This alliance has left the manufacturers with good memories--so good that Dormier wants more.

The aircraft company is working on the successor to the Alpha Jet and has renewed its agreement with Dassault to propose the Atlantic NG to the Germany Navy.

Uncertain Future at MTU

With controlling interest in an aircraft builder, all Mercedes needed to become a complete aeronautics group was an engine manufacturer. This matter is now resolved, since MTU is 100-percent owned by Daimler-Benz. With over half of its activities in aeronautics, MTU is going in on 40 percent of the manufacture of the Tornado RB199's.

Although the 2,200 RB199's ordered have meant success and prosperity for the Munich firm, the future is uncertain. The new jet engine for the EFA aircraft still has not been specified, and the other military program, the MM385, developed in cooperation with Turbomeca, is experiencing delays on the combat helicopter. For this reason, MTU has opted for joint venture in the civilian area, which already accounts for a quarter of its business. However, unlike SNECMA, the German engine builder is working with the two American giants Pratt and Whitney and General Electric.

American alliances are also found in the space and arms industries, where they seem to be supplanting European cooperation. With over 2 billion francs in the space industry, MBB-ERNO and Dornier are the principal manufacturers involved. From Ariane launchers to telecommunications satellites, these two companies are participating in all the European space projects. They specialize in living modules (Spacelab, Columbus) and are currently turning to NASA, inasmuch as the German government is still withholding its decision on the Hermes orbital aircraft project.

The same can be said of arms. After brilliant successes in cooperation with France (the Milans, HOT's, and Rolands with Aerospatiale and MBB), the new European arms projects are marking time. Either they are uncertain (the supersonic anti-ship missile), or they are spread out among a large number of participants (the CL289 reconnaissance missile, the multiple rocket launchers, etc.).

Everything is happening as if the Germany military were working together with the Americans to impose their views on the industry. As a result, all Luftwaffe arms are manufactured under American license.

Thus, after having produced over 25,000 Sidewinders under license from Ford Aerospace, Bodenseewerk will manufacture 10,000 copies of their modernized version. Similarly, with surface-to-air missiles, the military has preferred the Stinger and the Patriot to a joint venture with either Matra Mistral or Aerospatiale and Thomson (the Aster, the AS90). And, given the problems in the European arms programs at a time when Germany has just joined in support of the U.S. Space Defense Initiative, this trend is not about to reverse itself.

13014/9435
CSO: 3698/A690

WEST EUROPE/AEROSPACE

ARIANESPACE OFFICIAL VIEWS LAUNCHER COMPETITION

Paris LE MONDE in French 20 Aug 86 p 10

[Text] Three days after President Reagan announced the privatization of commercial space in the United States (LE MONDE, 19 Aug), the two primary American rocket manufacturers, Martin-Marietta and General Dynamics, received 35 orders for commercial satellite launches, the Secretary of Transportation, Mrs Elizabeth Dole, announced Monday, 18 August. She stated that a third company, Transpace Carriers, which is authorized to sell launches carried out by Delta rockets, has concluded two contracts for putting two satellites into orbit.

Although the launcher users obviously approved of them, the recent decisions of the American government concerning space policy have also been well-received by the Europeans, the Americans' main competitors in this market. Certainly, at Arianespace, the company responsible for the promotion and commercialization of the European Ariane launcher, they are not hiding the fact that "confronted with American companies, which are known for their dynamism and competence, the commercial battle will be difficult."

However, adds Mr Roland Deschamps, Secretary General of Arianespace, "the competition will not really be felt until about 1992." Arianespace will be using the Ariane-4 launcher, whereas the American manufacturers McDonnel-Douglas, Martin-Marietta, and General Dynamics will produce, respectively, Thor-Delta, Titan, and Atlas-Centaur rockets.

The coming competition to come will be more fair and clear-cut because the prices worked out in the United States must be "reorganized." Arianespace is accusing NASA of charging abnormally low prices to shuttle-users--"$80 million for a full cargo compartment (which can carry several devices), whereas the actual costs," according to Deschamps, "are closer to $200 or even $300 million."

The American agency responds that it has no reason to charge its clients for shuttle development costs, pointing out that the Ariane also benefits from European government subsidies. It makes no difference. The negotiations were spirited, and the Europeans believe considered situation to be unfair for Ariane, which is faced with a highly-subsidized space shuttle.

The entry of private companies into the commercial launch market should thus "go in the direction of more accurate cost accounting in the billing of launches," emphasized Mr Deschamps, who sees this as "a good thing." The Americans and the Europeans can now negotiate on equal terms, since both are now using conventional launchers.

It remains to be seen, he added, "whether the US Air Force, to have the maximum number of launchers available, will subsidize the start-up of production lines, which will further distort the competition. It is also necessary to find out under what conditions and at what price the American companies getting into the launch service market can use the NASA launch pads and staging facilities."

In any case, for Arianespace, as for the European Space Agency (ESA), the decision by the American government confirms (after the fact) the correctness of the strategy followed by Europe. This strategy was designed to be adapted to the changing needs of satellite launches and has resulted in a family of conventional launchers, whereas NASA has counted on the space shuttle alone.

13146/12851
CSO: 3698/670

WEST EUROPE/AEROSPACE

MATRA 1986 MILITARY, SPACE DIVISION EARNINGS

Paris LES ECHOS in French 20 Aug 86 p 11

[Text] The 1986 financial year is turning out in accordance with forecasts. For the first half of the current fiscal year, Matra SA had a sales figure of 2.63 billion francs, an increase of 8% as compared to the previous six months of 1985.

As expected, "military" activity showed a slight decrease of 1.66 billion francs as compared to 1.73 billion, whereas the "space" sector had a large increase of 49.3 percent to 926.2 million francs.

Matra does not publish consolidated sales figures, but in June 1980, the sales of the group's main company increased to 4.54 billion francs as compared to 4.04 billion the year before. Matra Transport has almost doubled its sales (324.7 million as compared to 143.6), whereas those of Matra Automobile increased by 47% to 704.8 million francs.

The 6 months profit and loss statement of the parent company, which will be published at the end of October, should not hold any unpleasant surprises. Indeed, today, the profit estimates made to the meeting by President Jean-Luc Lagardere cannot be questioned. He is counting on a consolidated net profit (the group's share of 130 million francs or approximately 80 francs per share (as compared to 180 million), since this year the subsidiaries made a negative contribution of 250 million, resulting in a positive contribution of 380 million francs for Matra SA (as compared to +698 million in 1985). These extremely cautious estimates are based on extremely pessimistic hypotheses.

The difficulties of the group are lessening although some branches are still having some problems--recovery was not on the agenda in the United States or in Europe. Accordingly, there will be losses at Matra Harris Semiconductors and at Comelim. The computer industry will still be in the red this year because recovery is underway and the deficit will be marketly decreased. As for the automobile industry, the accounts are at least balanced. Fiat is already cooperating in the field of automobile electronics with Solex and Jeager, although the agreement has not yet officially be signed.

1986, marked by the OGCT operation, will be a good year for the telecommunications sector, which has a large potential for development, especially in business communications. However, it is especially important that the group succeed in this area on an international level.

Moreover, Matra expects to obtain other contracts in the "transportation" and "space" branches. As for the military, orders for new materiel (particularly Mistral) are beginning to be put into concrete form. However this will not have an actual positive effect on the accounts until next year.

With the exception of an unforeseen event, 1986 will be the year Matra's "recentering" of its basic operations is completed and its financial recovery is confirmed. Starting in 1987, growth will again be on the agenda.

The share worth 1,650 francs at the beginning of 1986 is now worth 2.455 francs. The financial community anticipates good results next year.

13146/12851
CSO: 3698/670

WEST EUROPE/AEROSPACE

BRIEFS

SAAB SPACE ACQUISITION, ACTIVITIES--Saab Space AB of Goteborg, a part of Saab-Scania's Combitech, has become a part-owner of Intospace. This is a newly formed European company, the goal of which is the commercial utilization of space technology for research and development under conditions of weightlessness. "The production of new types of pharmaceuticals and new materials will be a significant part of activities on board the space stations of the nineties," said Ivan Ofverholm, executive vice president of Saab Space. [Text] [Stockholm SVENSKA DAGBLADET in Swedish 27 Aug 86 Sect 3 p 1] 9336

CSO: 3698/679

WEST EUROPE/AUTOMOBILE INDUSTRY

FRG FIRM SIMRIT PRODUCING INTAKE MANIFOLDS FROM PLASTIC

Duesseldorf VDI NACHRICHTEN in German 29 Aug 86 p 28

[Article by Hans-Juergen Reuss: "Injectors with Plastic Manifold"]

[Text] Worldwide, the automobile industry is pressing forward with the use of plastics in engines. At first it will be substitution of individual metal parts without changing construction. The goal of further developments is reflected in new designs which can fully utilize the properties of plastics. Carl Freudenberg's Simrit sector in Weinheim recently introduced the first components of this type which will go into series production later this year.

The use of plastic parts in the combustion engine is not at all a new task for designers in the automobile industry; however, successes have, of course, been quite modest to date. This situation could change if one company which has extensive experience in working with plastics now becomes active in this field. Consequently, the Simrit sector of Freudenberg is also concerned with "systematic substitutions." This primarily involves the creation of bases for each application: development of material and process, as well as shaping parts in a way that is suited to the material. In this respect the engineers at Freudenberg are concentrating exclusively on aggregate components. For example, water, fuel and oil pumps, carburetors, toothed pulleys, manifolds, gaskets, cylinder-head covers and oil pans provide realistic opportunities for the use of plastics in the next few years.

Several reasons, even if not all their advantages are equally effective in every component, can be advanced in favor of using polymer materials in engines. Thus, for example, on the average a 40 percent savings in weight can be expected which will have a clearly higher value in new designs. In contrast to sand-cast parts, plastics offer a substantially smoother surface which reduces flow losses in appropriate components. The low level of heat conductivity provides good insulation. Since no reworking of the parts is necessary, both investment requirements and production costs are reduced.

Problems for plastics which repeatedly occur in detail work are: sealing gaseous or liquid media, fastening parts, and applying forces. Inserting or molding bearings, joining or pressing on wheels, screwing in adapters or sensors must be studied in order to achieve functional, durable components. There are limitations on using polymer materials if they are to be introduced

in a current series. Of course, then their advantages cannot be fully utilized; on the other hand, testing them reveals numerous other advantages which make it possible for the user to incorporate them in planning.

The risk of application--in the broadest sense--is kept modest by the company. Comprehensive analyses of commercial efficiency determine whether a particular development will be started at all. In this connection, especially high economy can be achieved by integrating several individual parts in plastic parts. Well suited for substitution are chill-cast and die-cast parts of aluminum, and sintered parts. Apart from a few exceptions, sheet metal parts are completely out of the question. In the transition to plastic parts, substantial functional advantages must occur for the user if only cost parity with metal components is achieved.

The development of water pumps out of plastic, for example, gave Freudenberg the opportunity to shape this entire construction group in such a way that right down to the antifriction bearing they are not dependent on supply deliveries. In addition, housing, impeller and driving gear are available as individual components; the latter can be both a gear and a form wheel for toothed belt drives.

In the case of water pumps there was also a genuine problem in accessing existing design conditions in order to provide proof of suitability. Thus, locally there was redesign appropriate to the plastic, but in respect to installation the construction group was retained. Such a development requires not only a great deal of time, it is also rarely competitive. Conversion in a current series is practically out of the question if there are no particular problems with the old construction groups. Only a second step will result in optimized solutions with which not only the special characteristics of a material can be fully utilized, but also the installation situation can be improved. That results then in a reduction in costs in addition to functional advantages.

Water Pumps With Low Weight and High-Level Efficiency

The thermal and chemical demands on the materials for water pumps and the necessary resistance to aging produced thermosetting plastics. Since in this case phenolic resins offer special advantages in respect to durability, all pump components are made in various modifications of glass-fiber reinforced phenolic resins. In addition to unidirectional bending from the belt tension, overlaid with vibrations, the housing is exposed to high static bending if the cooling system heats up after turning the engine off because of the accumulation of heat. Today this problem is considered to be solved.

In addition to lower weight and low production costs, the better hydrodynamic design opportunities and the smooth surface result in a higher level of efficiency and thus diminished power input as compared to conventional water pumps. The power requirements could, in part, be cut almost in half. One advantage of plastic pump wheels, which was determined in testing, is their considerably lower lack of balance than that of the processed cast pump impellers. This results in lower noise development and longer service life of the bearing.

Several pumps are under development, others are ready for series production. In this Freudenberg is anticipating a decisive breakthrough in the next few years. In any case the company has its sights on all coolant pumps on automobile engines.

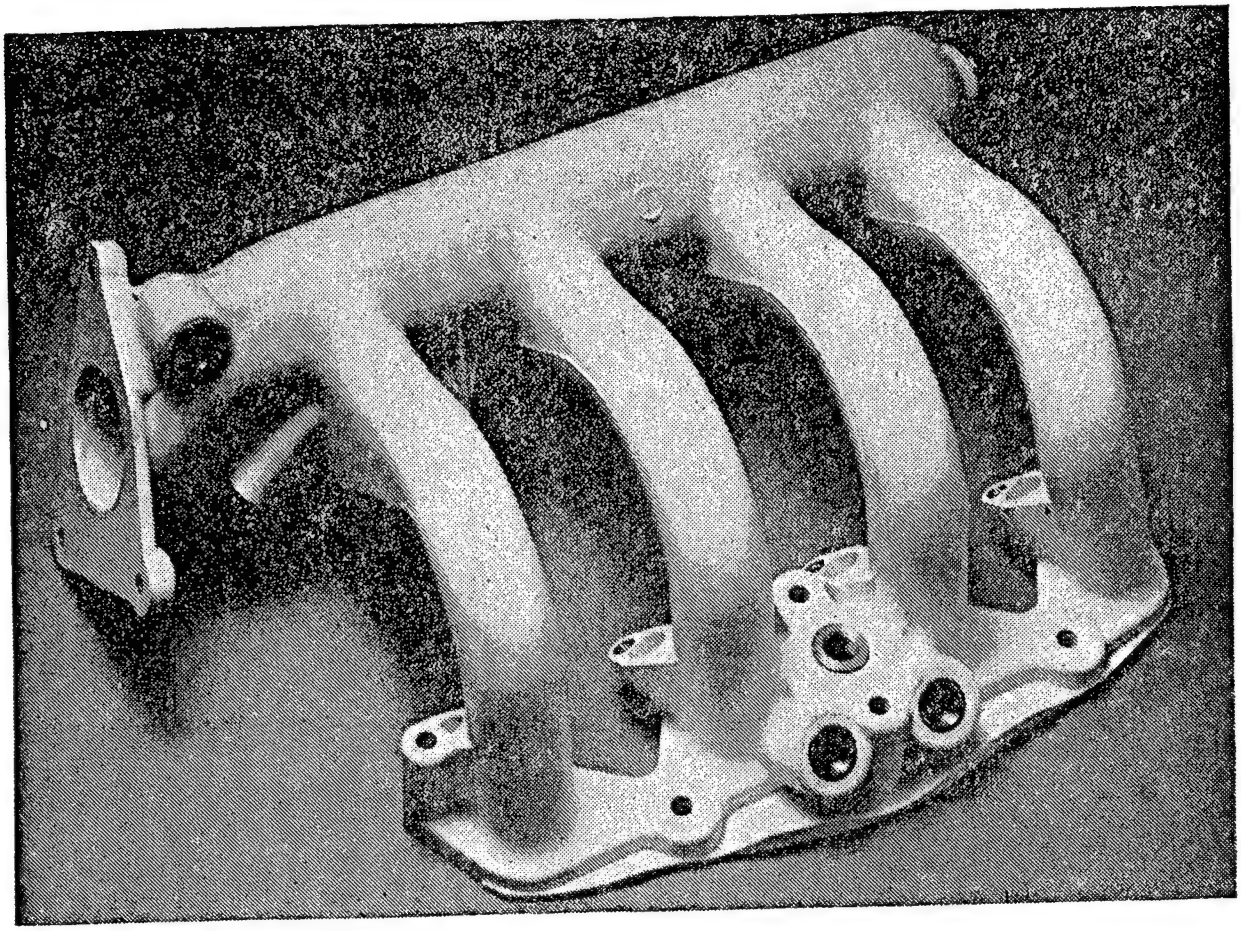
At Freudenberg the goal of work for manifolds from plastic was to develop flow-optimized intake manifolds which can be produced using the lost core method. After the transition to aluminum components several years ago, the situation today appears as if the plastic manifold could replace the metal tubing. Of course, one restriction must be imposed: this applies only to injection engines. The mixture preheating in Otto carburetor engines is impeded by the good insulating effect of the plastic. Studies with light metal plates between the water space and the suction channel revealed no satisfactory results. Thus, this direction was stricken from the development program.

In the otherwise unaltered engine the use of plastic manifolds is supposed to produce a measurable increase in performance. This is due to the smooth interior surfaces and to the better degree of admission because of the insulating effect of the tube. Today, if injection valves with plastic bushings are inserted in metal manifolds in order to avoid the formation of steam in the system, which makes starting the engine more difficult, then this points to an additional advantage of the plastic manifolds.

Today's requirements on manifold systems lead to increasingly larger and thus heavier components. This tendency supports the use of plastic with its weight advantage. Thus, the concentration of mass can be encountered in the upper sector of the engine. Beyond that the low resistance of the plastic pipes offsets the longer channels.

In Weinheim people are proud of a sample with series-produced parts which could be accomplished in only 5 months. Decisive in this, in addition to a combined CAD/CAM development for form and core parts, was also the full control of the manufacturing process. This depends heavily on the low-melting alloys of the core material which can consist of bismuth, tin, zinc, lead and cadmium. Details on this were not mentioned, but a great deal of know-how is behind it.

[Photo on following page]



Simrit manufactured the prototype of a one-piece, flow-optimized manifold from plastic using the lost core method. Compared to the conventional solution using metal this manifold is about 40 percent lighter; moreover, it can be series produced at a lower cost.

12124/12379
CSO: 3698/700

WEST EUROPE/BIOTECHNOLOGY

MAX-PLANCK STUDY URGES MORE PATENT PROTECTION FOR BIOTECH

Duesseldorf HANDELSBLATT in German 23 Jul 86 p 11

[Text] According to the views of scientists, new developments and discoveries in biotechnology should in the future be better protected with regard to patent rights than has been the case in the past. For this reason, the Max Planck Institute for Foreign and International Patent, Copyright and Competition Law in Munich has at the request of the OECD compiled a study which includes suggestions for reform.

By including biotechnological break-throughs in patent protection, patent lawyers believe that on the one hand, the flow of information from science and industry will increase and, on the other hand, this will encourage industry to invest in the field of biotechnology, according to a statement made by the Max Planck Society (MPG) in Munich.

According to the proposals of the Munich scientists, in the future it should be possible in all countries to receive patent protection for microorganisms (cell lines, plasmids, monoclonal antibodies) and macro-organisms (animals, plants), provided that they are new and have potential commercial applicability. Furthermore, the recommendations provide for patent protection for microorganisms in the FRG to include the filing of samples and a description. In this way, the manufacturing process and the microorganism can be protected by patent law, explained Dr. Joseph Strauss of the Munich Max Planck Institute.

According to a decision handed down by the Federal High Court of Justice in Karlsruhe, on the other hand, only the description of the manufacturing process for the microorganism is valid. However, this description must be formulated in each case in such a way that any specialist familiar with the field would be able to reproduce the results in a variety of ways, the MPG report continues. However, this point is regarded by scientists as a major obstacle to the generation of biotechnological organisms.

Strauss emphasized that it is not always possible to give an exact description of procedures. For this reason, the possibility of filing a sample of the microorganism has been introduced, which is intended to supplement, but not replace a description. Such a combination of description and sample is accepted, he pointed out, in Japan, the United States and is in keeping with

the practice of the European Patent Office. The Munich Max Planck Institute also suggested that in the future, a grace period of one year be granted for new developments. This should make it possible for a scientist to publish his results within this grace period, without excluding the possibility of patent protection at a later date.

12792
CSO: 3698/703

WEST EUROPE/BIOTECHNOLOGY

BRIEFS

FRENCH-ARGENTINE BIOTECH COLLABORATION--A French-Argentine seminar on biotechnology was held in Argentina from 12 to 16 May 1986. Seventeen French scientists and manufacturers participated in this seminar along with about 150 Argentines. The seminar encouraged industrial and scientific contacts in areas of training (specific training, information, and technology transfer). Argentina is planning to set up a biotechnology development program within the next 2 months. It also wishes to participate in the EUREKA biotechnology programs; an Argentine industrial delegation came to France for this purpose in early June. [Text] [Paris BIOFUTUR in French Jul-Aug 86 p 14] 25048/12948

ITALIAN INDUSTRY SPONSORING PUBLIC R&D--An agreement was signed between the Italian Naitonal Council for Research (CNR) and ENI, the Italian oil company. Biotechnological research should get nearly one-fourth of the Fr 700-million total. Studies will be done on protein engineering, vaccines, and increasing the rate of petroleum recovery through microbiology. Agreements between the CNR and Farmitalia Carlo Erba, the pharmaceutical branch of the Montedison group, and between the CNR and Fiat are said to be under study. Moreover, a national committee on biotechnology, bringing together specialists and members of the principal industries concerned, has prepared a report on the status of biotechnology in Italy and on strategies to be developed in the future. (Source: BIOENGINEERING NEWS, CNR, 30 Apr 86) CNR, 2710 Pavia, Italy. Tel. 39-382-4224 11 (Professor Falaschi). [Text] [Paris BIOFUTUR in French Jul-Aug 86 p 15] 25048/12948

FRG AUTHORITIES FUNDING BIOTECH-The Federal Republic of Germany will spend DM1 billion (Fr 3 billion) on a 3-year program in biotechnology for agriculture and the agro-food industries: plant cell biology, and the manipulation and microorganisms and enzymes. (Source: EUROPEAN CHEMICAL NEWS, 12 May 86) [Text] [Paris BIOFUTUR in French Jul-Aug 86 p 16] 25048/12948

SWEDISH-CANADIAN HYBRID WORK--Weibull AB has reached an agreement with Allemix Inc of Toronto, which is one of the leading biotechnology companies in North America. "Allelix has come a long way in developing the genetic properties that are needed to produce rape hybrids," said Hans Svensk, chief of oil-yielding plant cultivation at Weibullsholm. "Our part in the project will be to supply suitable parent strains of rape." [Text] [Stockholm SVENSKA DAGBLADET in Swedish 25 Jul 86 Sect 3 p 1] 9336

CSO: 3698/679

WEST EUROPE/CIVIL AVIATION

COMMENTARY ON AIRBUS INDUSTRIE, MCDONNELL DOUGLAS TALKS

Brussels LE SOIR in French 26 Aug 86 p 2

[Text] Could the American manufacturer McDonnell Douglas and the European consortium Airbus Industrie agree on jointly putting together a long-range plane of a size smaller than the 747 jumbo?

The question, recently raised at the Hanover Fair, seems to be coming up again with greater intensity on the eve of the Farnborough Air Show opening at the end of this month.

The two groups have at least one thing in common: each is doing research into a plan for a plane of this size. The McDonnell Douglas plane, a trijet derived from the DC-10, is more advanced, to the point that its launching is expected from one day to the next. The Airbus Industrie plane, not far behind, is a four-jet to be developed on the framework of an A-330 twin jet from which it will inherit the airframe and wings. In view of all the financing problems, it could not at best be launched earlier than next year. These two aircraft are quite different both because of their engine arrangement and primarily in their sizes. The McDonnell Douglas will offer more than 350 seats of mixed configuration while the European four jet will probably remain at this side of 300 seats. It remains to be seen whether the A-340 or American MD-11 will be more likely to satisfy market requirements. For months both competitors have been contacting potential customers, mainly companies such as Sabena, already using DC-10s. But the one wooed most intensely has been Swissair which has acquired a reputation insofar as selection is concerned, after being the charter customer for the MD-80, Airbus A-310 (a position shared with (Lufthansa), and most recently for the Fokker F-100. According to "Aviation Week," Swissair opted in favor of the MD-11 during negotiations on a new air agreement between Switzerland and the United States. A second highly likely customer is the American company Delta Airlines which will probably announce its decision shortly. But it looks as if the manufacturer may not as yet have crossed the threshold of 20 aircraft sold which had been set for placing the MD-11 in production.

Everything indicates that McDonnell Douglas plans to exploit the advantage it has gained. It is pursuing wind tunnel research activities to put the finishing touches on the aircraft's aerodynamic profile. On the outside the MD-11 will resemble the DC-10 whose wings it will share even though it is equipped with wing tips. The primary modifications will affect the rear end of the

plane whose horizontal stabilizer will be sharply reduced. Proof of its determination: The American manufacturer has put together actual size mockups of the plane's cockpit and cabin.

As things now stand it seems unlikely that McDonnell Douglas will give up on building the MD-11, even in the hypothesis of a possible future agreement with Airbus Industrie. The American manufacturer would rather persuade its European competitor to abandon its A-340 project so as to cooperate with McDonnell Douglas in the MD-11 program. The transfer of the first aircraft's wings to the second is probably within the realm of possibility. To make up for it, McDonnell Douglas will probably offer its cooperation in construction of the A-330 twin jet and will ensure its marketing in the United States.

For Airbus Industrie this probably calls for an agonizing reappraisal. The building of the A-340 is in fact tied to that of the A-330 of which it is a direct descendant. Projected development costs must be divided between the two aircraft having many common elements. Thus the small enthusiasm expressed on the French side where the memory persists of the unconscionable operation set up with McDonnell Douglas to sell the Caravelle in the United States. Instead, the American firm was inspired by the design of the French plane and built the DC-9 which then went on to become the Caravelle's major competitor.

But financial reasons can sometimes be stronger than reasons of the heart. Could the $3 billion needed for the joint development of the A-330 and A-340 ever be raised? The British, representing 20 percent within the European consortium, are showing hesitation which may be passed on to other partners. All the more so since the latter have already been crushed by the very heavy A-320 development costs, initial deliveries of which will be made in 1988. Added to that a drop in sales of the A-300 and A-310 in the first half of this year.

Also, the offer of assistance by the American manufacturer who is doing battle like the Europeans with the Boeing giant, whose sales figures have broken all records in 1986, cannot be dismissed without deeper examination. It will probably be one of the main topics of conversations at Farnborough.

9436/13045
CSO: 3698/689

WEST EUROPE/COMPUTERS

NOKIA JOINS NORSK DATA TO INCREASE MARKETS

Helsinki HELSINGIN SANOMAT in Finnish 18 Sep 86 p 31

[Article: "Nokia Becomes a Work Station Subcontractor for Norsk Data"]

[Text] The Norwegian computer company, Norsk Data, which established its own subsidiary company in Finland last spring, is launching a joint venture with Nokia. Visiting in Finland on Thursday, Norsk Data general manager Rolf Skar told us about the agreement.

According to the as yet unsigned agreement, Nokia Information Systems will become a subcontractor of Norsk Data and will start manufacturing work stations for the Norwegian company's minicomputers specially designed for Norsk Data.

According to general manager Skar, cooperation is well suited to Norsk Data's worldwide strategy: The company is trying to tailor its products to the special needs of each country. In the Nokia-Norsk Data joint venture, however, it is a question of more than that. Through product consolidation they are also aiming for international exports outside Finland.

Up to now Norsk Data's biggest supplier of work stations and display terminals has been the Norwegian firm, Tandberg. Norsk Data intends to use Tandberg stations in future as well, but Nokia will probably in future cut itself a big piece of the pie as a supplier of Norsk Data work stations.

Norsk Data sells from 20,000 to 30,000 work stations a year as a sideline to its minicomputers. Since the agreement is still officially in the negotiation phase, Nokia Information Systems manager Kalle Isokallio did not want to go ahead and estimate how much of that amount might in future be Nokia's share.

Advanced Biotechnology

Orderers of Norsk Data systems will determine its share, but, according to Isokallio, it can amount to a big one because the display terminals will be specifically designed for Norsk Data computers. Characteristic of them, according to Isokallio, are high quality and advanced design in biotechnology.

Nokia's work stations will at any rate be a clearcut trump card for Norsk Data in the competition on the Finnish market and also in Sweden where Nokia's terminals have otherwise been selling very well.

While they regard their victory in the Norsk Data bidding competition as an important one at Nokia, it will not, according to Isokallio, result in plant expansions. Nokia Information Systems can, as a subcontractor, use the Salora monitor production line and put the finishing touches on the work stations at the Kilo plant in Espoo.

The Papyrus Company represented Norsk Data in Finland from 1981 until Norsk Data established a subsidiary company last spring. It will go into active operation this fall with Kurt-Erik Roos, formerly general manager of Typlan, as its general manager.

According to Roos, increasing Norsk Data sales in Finland will depend largely on the cooperative venture with Nokia. Norsk Data is still aiming at a strong sector, supplying systems for the graphics industry. In addition, the company is selecting other targets in this narrow sector, like operation control systems for the paper industry.

Norsk Data sales in Finland for the first half of this year came to just under 10 million markkas. According to Roos, the goal for next year is a growth rate of over 10 percent.

Growing at a rapid rate during the present decade, Norsk Data started to establish its own subsidiary company in Finland late in comparison with other West European countries. According to Rolf Skar, the reason for the delay was a shortage of funds due to the fact that the company network was being developed elsewhere in Europe. The company's most important export countries are West Germany, Sweden, France, England and the United States. Asia, and especially India, are to be looked into.

The Helsinki Stock Exchange does not at present interest Skar because sales in Finland are still moderate. And the company does not have any financing problems at the present time either.

Norsk Data already has nearly 10,000 stockholders, most of whom are abroad. Only Norwegians are allowed to buy A shares, which entitle the holder to vote.

11,466
CSO: 3698/7

WEST EUROPE/COMPUTERS

BRIEFS

FRENCH BUBBLE MEMORIES--Although the 4-megabit bubble chip is not yet commonly used, people are already thinking ahead. In collaboration with the Grenoble University Laboratory for Electronics and Data Processing Technology (LETI), SAGEM [Company for General Electricity and Mechanics Applications] is studying the use of ion implantation in manufacturing bubble memories. Initially this technique will be developed for use in 4-megabit chips, but larger-scale applications are planned. In the near future and possibly with Hitachi's cooperation, this should result in a 16-megabit memory and either in the late 1980's or the early 1990's in a 64-megabit version. This would measure 1 square inch, about 6 square cm. [Excerpt] [Amsterdam COMPUTABLE in Dutch 20 Jun 86 p 27] 25023/13045

CSO: 3698/A203

WEST EUROPE/FACTORY AUTOMATION

ARA PROGRAM PROMOTES FRENCH ROBOTICS

Paris L'USINE NOUVELLE in French 12 Jun 86 pp 56-57

[Article by Michel Defaux: "Research in Question"; first paragraph is L'USINE NOUVELLE introduction]

[Text] In 5 years the ARA program has enabled France to join the front-runners in robotics research. Its success cannot be denied, but the industrial spin-offs are still insufficient and budget cuts constitute a threat.

A total budget of about Fr 60 million per year, 250 researchers and 25 manufacturers associated: in 5 years (from 1981 to 1985) the ARA (Advanced Automation and Robotics) program has enabled France to rank among the five world leaders in robotics research. However, the assessment made during the Productique [CIM] 86 exhibition was very uneven. Indeed, researchers are satisfied and wish to continue the program, but the manufacturers regret the absence of readily industrializable products.

Twenty-one patents have been registered, 22 product-oriented projects are underway, and 160 specialists have been trained by this research. Other positive aspects are: many companies have been established in the ARA environment: ITMI [Industry and Technologies of Intelligent Machines], Midi-Robots, AICO, Digital Design.... In the laboratories, both the collaboration among the various teams and the coordination with manufacturers are stressed. Moreover, manufacturers do not underestimate ARA's importance and are pleased to note that few programs have brought together such potential and associated so many manufacturers.

Yet as soon as the topic of industrial spin-offs arises, wry looks are exchanged. Hydraulic engines, prehensiles, seam-following sensors...will be industrializable only after a minimum period of 2 years, if all goes well. Spin-offs in other areas are frankly insufficient. Thus, PSA [Peugeot SA], although satisfied with the help given for the Meudon flexible workshop and for robot programming in computer aided design, regrets that topics such as components handling, mobile robots, and optimal components design to facilitate assembly have aroused little interest among researchers. Finally, and this is the strongest criticism, manufacturers emphasize that robotics is only one aspect of computer integrated manufacturing. What about numerical controls, computer aided design and manufacturing, and local area networks? This viewpoint is

supported by Claude Laurgeau of ADI [Data Processing Agency], who observes that 50 percent of France's 500 researchers in industrial process control and automation specialize in robotics alone--a situation ignoring entire sections of production. "There are 4,000 robots in France, compared to 650,000 machine tools, 40,000 of which are numerically controlled. I cannot even cite three or four machine tool research laboratories."

Attractive Offers From Abroad

What might come after ARA? One hears whispers about a PRISME (Computer Integrated Manufacturing Robotics, Systems and Machine Intelligence) program covering assembly, flexible workshops, and mobile robots...provided that sufficient funds are available. "Otherwise," stresses Georges Giralt, who is responsible for the ARA program, "the transition will be delicate."

The current 250 "top-level" robotics researchers are, as they state themselves, in a shaky position. Their future depends on the continuation of the current efforts and quantitative and qualitative investments in data processing equipment. The CNRS [National Center for Scientific Research] for its part, which is at ARA's origin, wishes to preserve the achievements by redirecting the 35 teams along three lines: research (manufacturing and non-manufacturing robotics), training through research, and the implementation of transfers. Here again, everything will depend upon the budgets. "Until then, the CNRS has had to increase its grants. This will be difficult with the budget cuts scheduled for 1987."

There is a risk that the teams will split up and disperse. There are, of course, the European ESPRIT and EUREKA programs, but the attractive offers from abroad, particularly from the United States, are multiplying and make researchers think twice. They affirm that research funds available in foreign laboratories are 10 times higher than in France.

25041/12859
CSO: 3698/A181

WEST EUROPE/LASERS, SENSORS, AND OPTICS

GALLIUM ARSENIDE, OPTO-ELECTRONIC RESEARCH AT FRANCE'S CNET

Paris ELECTRONIQUE ACTUALITES in French 27 Jun 86 pp 1, 25

[Article by G. Cuciuc: 26 Percent of CNET's R and D Activity in Components]

[Text] On 18 June CNET [National Telecommunications Studies Center] presented its research in the design and fabrication of components and the development of related technologies, especially those used in telecommunications. The primary goal is to remain highly competitive with the Japanese and the Americans on the research level.

The increasingly important role of electronic components in telecommunications (26 percent of the integrated circuits in France are used in telecommunications) and, currently, of opto-electronic components, has led CNET to take more and more interest in these areas. In 1985, 26 percent of the center's programs were devoted to components and related technologies.

However, CNET's director, Mr Poitevin, stated that the center's study and research must continue to focus on its raison d'etre, telecommunications, although interest and attention would be paid to the impact on other fields. To this end, special relations have been established with CNRS and the universities, as well as with industry (Thomson, CGE, MHS).

Current components and technology programs deal with fields such as silicon technology, integrated circuit design, III-V components (e.g. gallium arsenide) and opto-electronics (e.g. optical fibers).

Monolithic Laser/Transistor

The Bagneux (Paris B) laboratory has just achieved the first monolithic integration of an AlGaAs-GaAs laser and a control transistor in Europe, according to CNET. In Japan and the United States, micro/opto-electronic integration is the subject of intense development, since it considerably increases the possibilities for optical signal processing.

Due to the multiple-layer structure inherent to lasers and the single-layer structure of field effect transistors, photolithographic operations present a tricky "planarization" problem.

Two different structures have been successfully created and tested. Both use metallo-organic chemical vapor deposition to build index-guided AlGaAsGaAs lasers with Si ionicly implanted in a semi-insulating GaAs substrate for the achieve TEC layer. Now that feasibility has been demonstrated, the study is focusing on making an integrated emission circuit consisting of a semi-conductor laser and its TEC modulation circuit.

CNET's Bagneux laboratory is joining the Japanese and American competition in the area of high speed gallium-arsenide micro-electronic circuits. Fileds targeted throughout the world include not only high-speed logical applications, but also ultra high frequencies and analog computing.

Bipolar Transistor ECL Logic

CNET has just obtained its first significant results in the circuit field with circuits that allow feature measurement and comparison to the simulation. Performance was tested on an 11-stage (33 transistor) 3-micron technology ring oscillator with a 3-micron width emitter finger and 1-micron superposition accuracy. The first fabrication batch, made using a non-optimized technology, provided a per-stage propagation time measurement of 245 ps, entirely consistent with the simulation.

The fabrication process uses molecular jet deposition to grow the Ga As layers. This program, in which CNET heads up an Esprit project, should produce the stabilization of the 3-micron line, the demonstration of diversified circuits (divider, adder, multiplexor, etc.), and the development of a self-aligned 1-micron line for which technology studies are underway.

The Lanion center has developed two processes for optical fiber and cable fabrication designed to reduce the cost of transmission systems. The first, an SPCVD process, creates a preform by depositing glass inside a silicon tube. It uses a cold-plasma-activated reaction with a yield of betwen 80 and 100 percent (compared to 20 to 60 percent using traditional heat-activated techniques). Deposits can be several milimeters thick, since the energy needed is confined to the inside of the tube.

The second fabrication process, MCL (Multifibering and Cabling on Line), allows:

-simultaneous stretching of several preforms (multifibering);
-optical fiber cable production (cabling)

By avoiding numerous melds, this continuous fabrication solution should make it possible to reduce costs, especially for distribution networks that require a lot of cable. The license and know-how for the MCL process, as well as for the induction ovens required for fiber production operations, are currently being transferred to industry.

These studies, whether in progress or in the process of industrialization, represent only a few of CNET's 650 patents, 100 of which were obtained in 1985. It should be noted that CNET does not give exclusive rights to its patents, but that priority is given to domestic industry. The price is considerable but not prohibitive in order to motivate the manufacturer to carry the project through. CNET's research programs cost a total of 1,442,000,000 francs, of which 467,000,000 francs are for the components and technologies field.

13014/12781
CSO: 3698/645

WEST EUROPE/LASERS, SENSORS, AND OPTICS

FRENCH RESEARCH IN SENSORS FOR COMPUTER-AIDED VISION SYSTEMS

Paris INDUSTRIES ET TECHNIQUES in French Special Issue Jun 86 pp 82-83

[Excerpts] Computer vision is leaving th confines of the laboratory and making its way into various industrial applications, especially shape recognition, quality control, and sorting. While CCD and video cameras are both being used, the weak points are still image analysis and interpretation.

Computer vision is currently experiencing a remarkable boom. The number of companies involved is growing rapidly, partly because there is now a market, and partly because vision systems are relatively easy to develop. The machine must be capable of partially or totally replacing the human being in operations that require sight.

Image representation is the last phase in the computer-vision process. It is also the most difficult and the least understood, and is the Anchilles heel of the current systems.

Most current research focuses on [...] 3D systems. The first step is to perfect true three dimensional sensors. Many laboratories are active in this area and have produced prototypes. LETI [Laboratoire d'Electronique et de Technologie de l'Informatique] has developed a 3D camera that provides a 256 x 256 point XYZ image. It is not sensitive to ambient lighting, since it uses laser light. The prototype is currently being validated. Its operating rate is limited to eight 65,000 point/second images. Deflectors designed to increase this rate are being studied.

LETI and LIFIA [Laboratoire d'Informatique Fondamentale et d'Intelligence Artificielle] are tackling the relatively unexplored field of color vision. Little progress is reported.

ENSEEIHT [Ecole National Superieure d' Electrotechnique, Electronique, Informatique et Hydaulique de Toulouse] is devoting its research to a special sensor that restores color images using the sequential analysis principle. Here, the difficulties arise from data quantities three times greater than for black and white.

LAAS [Laboratoire d'Automatique et d'Analyse des Systemes] is attempting to simplify the programs needed for stereovision. These programs use a hierarchical approach that permits a better grasp of the correlation

between pixel and image. INRIA [Institut National de Recherche en Informatique et en Automatique] has adopted the same approach and is currently developing programs capable of resolving 3D navigation and analysis problems. These programs are designed for industrial robotics. The first version of a 3D random-orientation system has been built (the data is processed on a microcomputer) with an average part localization time of 27s.

CERFIA [Laboratoire Cybernatique des Enterprises Reconnaissance de Forme et Intelligence Artificelle] is conducting 3D studies in structured light and photometry. Elsewhere, Thomson/TITN is studying a hardwired preprocessing board with object recognition on a single analysis line.

13014/12781
CSO: 3698/645

WEST EUROPE/MICROELECTRONICS

PHILIPS, SIEMENS, THOMSON IN 64-MEGABIT PROJECT

Paris L'USINE NOUVELLE in French 10 Jul 86 p 19

[Article by Claude Amalric: "A Europe of Research Takes Shape"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Forget differences: We must unite. Philips and Siemens have held out their hands to Thomson for joint development of integrated circuit technology. Motive: It will cost Fr 15 billion!

The proposal made by Philips and Siemens to Thomson to collaborate on developing integrated circuit technologies for 1995 is a milestone. It is a significant turning point in the relations between the French firm and the two other companies, which had been rather strained since the failure of UNIDATA [European standardization program]. Further resentment over widely divergent practices made any agreement between Philips and Thomson in this field impossible. The proposal for joint research is therefore quite an event. "It involves precompetitive research comparable to that coordinated in the ESPRIT program," insists Bernard Levy, director of research and programs for Thomson Semiconducteurs. Preparatory meetings are currently defining objectives and their possible allocation. Work could begin in 1987 and will focus on developing European submicron-level technologies. The first application, a 64-megabit memory, is expected by 1995.

It is worth noting that this joint research is independent of the ESPRIT CAD [computer aided design] research project, in which Thomson is already associated with Siemens. Philips and Thomson are likewise cooperating in RACE [R&D in Advanced Communication Technologies for Europe], another European program. AS for the Megaproject linking Siemens and Philips, it is being kept separate.

If successful, the Philips-Siemens-Thomson program will supply Europe with its own technology, but approximately Fr 15 billion will be needed. That is why the Germans (Siemens and AEG [General Electric Company]) would like to conduct their research within EUREKA. Thomson, as well as LETI [Laboratory for Electronics and Data Processing Technologies] and MHS [Matra Harris Semiconductors], would prefer ESPRIT. However, the French consortium's main aim is to open the door to the British GEC [General Electric Company], Plessey, and [the Italian] SGS [General Semiconductors Company].

Will a Europe of semiconductors finally be achieved? "These are only initial steps," Bernard Levy observes cautiously. We wager that this objective will be achieved sooner than he thinks. And let us give credit to those who have silenced all grievances: thanks to the Japanese!

25047/12859
CSO: 3698/A195

WEST EUROPE/MICROELECTRONICS

FRENCH THOMSON AFFILIATE IN SUBMICRON CLASS

Paris L'USINE NOUVELLE in French supplement to 19 Jun 86 pp 16-17

[Article by Alain Dieul: "Integrated Circuits: Eurotechnique in the Submicron Class"]

[Excerpts] One can no longer visit the new production line for integrated circuits of Eurotechnique, the subsidiary of Thomson Semiconducteur. If the doors are closed at Rousset, close to Aix-en-Provence, it is to guarantee the extreme cleanliness which now reigns at the heart of the plant. In order to enter the 310 square meters of class-10 clean rooms, one has to pass through four air blowers which remove all dust remaining on coveralls. Thus, the farther one penetrates into the core of the production unit, the cleaner the zones are. They go from class 1,000 to 100, and then to class 10.

With the production line installed at Rousset engineers increased cleanliness by a factor of ten. Thus far class-10 cleanliness was only achieved at the level of the silicon wafers and in very limited volumes. By extending it to the entire working surface surrounding the machine, the cleanliness reaches class 1 at the silicon level, i.e., a value which can no longer be measured by machines! To achieve this result, the total air volume is renewed 10 times per minute.

The impressive sum of Fr 250 million has been invested [in equipment]. According to Marc Lassus, director of the center, this amount will have to be doubled in order to complete the machines (Fr 160 million have already been spent). In fact, for the moment, not all the clean rooms are completely equipped. "Our line produces wafers of 125 mm in diameter, but it could perfectly well be adapted to 150-mm wafer production. However, this size is not yet justifiable today, all the more so as it is technically difficult, and thus very costly, to get below the 1-micron level while also increasing the size of the wafer," explains Marc Lassus. This line, designed by Thomson's Japanese partner OKI, should produce 20,000 wafers per month at full production. It will employ 60 engineers and technicians and 140 operators divided into five teams.

To reduce the sources of dust the Thomson engineers are counting on extensive automation. Chemical hooding and silicon wafer cleaning have already been

automated. A robot picks up the cassettes of wafers and plunges them into the various baths in a class-10 environment, the role of the operator being limited to programming the sequence on a keyboard. The loading of the diffusion ovens will soon be carried out by a triaxial robot still using the "cassettes to cassettes" principle. "We still have to develop the interface between the transfer machine and the robot so that the automated guided vehicles can distribute the cassettes to the various zones," explains Robert Michel, one of the people responsible for the development of the production line.

Two photorepeaters have been installed, a Censor and an Optimetrix. They are used to project the circuit mask onto the silicon wafer. The masks themselves have been drawn by two Micralign masking devices from Perkin-Elmer.

"Thanks to the research conducted by LETI [Laboratory for Electronics and Data Processing Technology] in Grenoble, we will produce circuits in HCMOS-IV [High-Speed Complementary Metal-Oxide Semiconductor] beginning in 1989. These circuits will enable us to realize 0.8-micron patterns," forecasts Marc Lassus. In the meantime, and in spite of another year which has been economically difficult for integrated circuits, Thomson has reached 1.5 percent of the world market. With the Rousset unit, Thomson will gradually have the means to achieve its target: 3 percent of the world market and a position among the 10 leading semiconductor manufacturers.

25041/12858
CSO: 3698/A191

WEST EUROPE/MICROELECTRONICS

CNET PILOT LAB DEVELOPS FRENCH 1 MICRON CMOS TECHNOLOGY

Paris L'ECHO DES RECHERCHES in French No. 122, Fourth Quarter 1985 pp 5-14

[Article by Michel Brillouet [see biographical caption]; boxed items and captions follow after main article; first paragraph is introductory summary by L'ECHO DES RECHERCHES]

[Excerpts] From its very outset, the CNET-Grenoble equipped itself with a Pilot Laboratory simulating a production line for silicon integrated circuits [IC's]. This end-use places constraints on the type of work done on this line, but also on the CNET's resources in terms of personnel and equipment, its environment and its organization. However, this effort is bearing its fruits: The techniques that have been developed, and validated on complex circuits, have enabled the assembling of a 1.5-micron logic CMOS technology, and the elements are in hand now for a 1-micron "Telecom" (logic + analog) CMOS technology.

Resources Involved

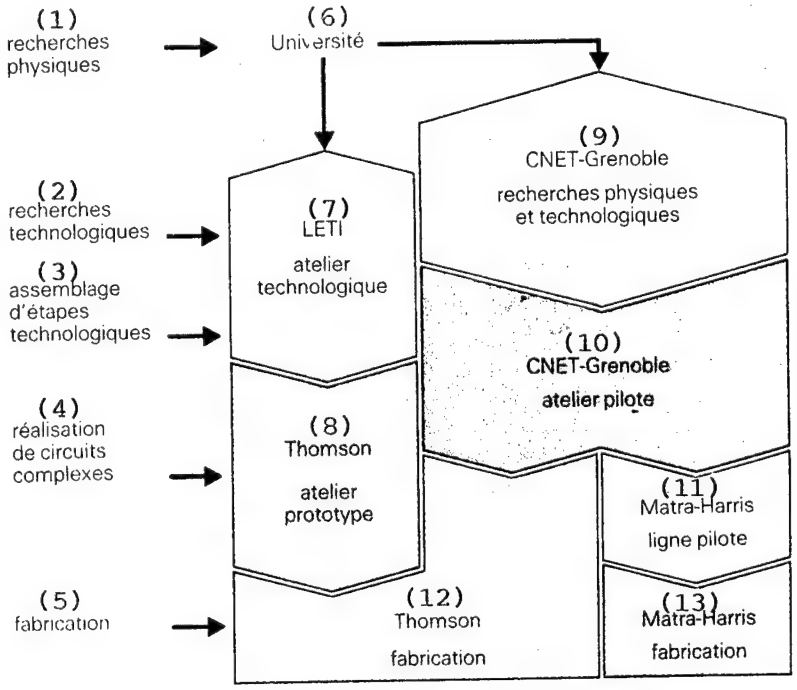
To carry out its work, considering its specific nature, the CNET-Grenoble Pilot Lab has committed substantial resources to this effort, in terms of both personnel and equipment, and has put in place a structure designed to optimize the effectiveness of this commitment.

Personnel

After starting out in 1979 with two engineers, charged with defining the effort as a whole and purchasing the initial equipment, the Pilot Lab underwent very substantial growth during the years 1981-1983, with a massive influx of experienced technical personnel acquired from industry. Since 1984, this influx has diminished sharply, with growth stemming from internal changes within the CNET or the PTT. There has also been a not insignificant number of departures toward industry (a form in itself of technological transfer). Around 90 persons can be considered to be working more or less directly within the pilot Lab (Footnote 2) (An exact figure is difficult to arrive at. It varies according to whether the identity of the Pilot Lab is confined strictly to that of the division most involved, or to that of the personnel working on the technological research project (as identified in the CNET-Grenoble's Long-Range Development Plan), or to the total of the personel within or outside the CNET who work in its clean room).

Fig 1

CNET-Grenoble Pilot Lab's Place in Development of French MOS Technologies



Key:

1. Physical research.
2. Technological research.
3. Assemblage of technological stages.
4. Realization of complex circuits.
5. Fabrication.
6. University.
7. LETI Technological Lab.
8. Thomson Prototype Lab.
9. CNET-Grenoble - Physical and technological research.
10. CNET-Grenoble Pilot Lab.
11. Matra-Harris Pilot Line.
12. Thomson - Fabrication.
13. Matra-Harris - Fabrication.

Motivation, competence and group work characterize a large number of this personnel, without which none of the objectives set forth in our Long-Range Development Plan could have been attained.

Another essential characteristic of the Pilot Lab, as compared to laboratories more up the line, is that a sizable part of its operation depends on a large number of technicians (ensuring the stabilization of procedures and the maintenance of the equipment, which is sometimes very complex), and on a highly qualified staff of practical-implementation personnel (operators), thanks to whom high-quality and reproducible work is made possible.

[Boxed item No. 1, p 7]: Machines Installed in CNET-Grenoble Pilot Lab

--10 oxidation tubes
--5 diffusion and annealing tubes
--8 LPCVD [Low Pressure Chemical Vapor Deposition) tubes
--2 PECVD [Plasma Enhanced Chemical Vapor Deposition] tubes
--2 medium-current ion implanters (B, P, As)
--2 automatic cleaning machines (FSI)
--1 fast annealing machine
--1 automatic tube-cleaning machine
--1 brushing machine
--1 projection machine: 1:1
--1 stepping photoreducer: 10X
--1 electronic masker
--2 automatic resin-spreading-and-developing lines
--1 automatic mask-control machine
--2 optical metrology apparatuses
--1 metrology sweep electron microscope
--4 plasma etching machines
--3 metal-spraying machines
--3 metallic-deposition evaporators
--1 PECVD deposition-machine
--cleaning tables and centrifugers
--liquid-etching tables and centrifugers
--characterization apparatus (ellipsometer, spectrophotometer, infrared spectrometer, optical and sweep electronic microscopes, "Surfscan" fault analyzer, etc.) [end of boxed item]

Environment

The above equipment will not enable the realization of complex circuits unless it is installed in an adequate environment. This means:

--A room in which the content of particles in the air is rigidly monitored (an atmosphere containing less than 100 dust particles of diameter greater than 0.5 microns, per cubic foot, is termed a "Class 100" atmosphere). This monitoring extends not only to the filtration of the new air, but also to the special clothing that is worn, the working methods of the personnel, and the equipment in use;

--An accurate control of the temperature (particularly insofar as concerns the stability of the optical instrumentation), of the humidity (certain equipment used is highly sensitive to humidity);

--Use of very highly purified products (de-ionized water, gas, liquid chemical products) in the fabrication of the integrated circuit;

--Entirely trouble-free and fail-safe power-supply, air-conditioning, and gas-supply installations. Every equipment failure produces transitory, often unpredictable, phenomena. We have noted, for example, that a several-minute air-conditioning outage can produce a covering of dust in the heat treatment tubes 1 to 3 days after the outage; this phenomenon, all the more important in view of the briefness of the outage, appears to have been eliminated by a more timely restarting of the air conditioning.

Boxed item No. 2 transcribes into figures what this type of environment represents for the CNET-Grenoble Pilot Lab. Clearly, careful control of all the parameters is a necessary condition, but is not sufficient to reduce the density of faults of a circuit. Presently we are attaining a "Class 10" environment at the entrance to the oxidation tubes, and still the number of dust particles collected by a silicon wafer is not negligible for complex circuits.

Another aspect of this environment is its computer-aided manufacturing [CAM] system. More and more industrialists are using a software, either on the market or developed in-house, to track the progress of the silicon boards through the production line. We have developed a system called BASIL, now being marketed, which is particularly well suited to a development laboratory such as ours, where procedures change very rapidly.

This software enables:

--The defining of the procedure for carrying out each operation on the wafers;

--The indicating of the proper hookup of the stages for the realization of a given circuit;

--Tracking the routing of the batches of wafers through the room, and gathering the measurements made on the circuits during their fabrication;

--The recording of every trouble alert or intervention that takes place on a machine.

BASIL is now a tool as indispensable in the production room as is any measuring apparatus: It enables the effective management of work planning and the a posteriori analysis of results attained by the circuits.

Organization

Generally speaking, the functions of a Pilot Lab are as follows:

--Stabilization and development of the individual techniques. At CNET-Grenoble, this task is performed in great part by two departments: One is devoted to the printing of the images of a circuit at different levels (photolithography); the other does the mating of the layers (oxidation, deposition) and the controlled incorporation of impurities (ion implantation, diffusion). This function is also performed by some of the personnel of the Physical and Technological Research Division in connection with, at times, exploratory techniques, but also in connection with more industrialized procedures.

These same departments also perform maintenance (heavy maintenance as well, at times) on equipment.

--Control of environment. An entire department is assigned to this task, which is often an obscure one (publications concerning it are rare!) and nevertheless an essential one.

--Routing of the boards within the clean room and performance of the operations necessary for the realization of a circuit. This work is done by two technicians and the staff of operators assigned to the two departments of the Pilot Lab.

--The design of an array, tracking of its fabrication, and testing of the circuits are in large part done by a "hookup team" which is responsible for the definition and coherence of the hookup of the individual stages, as well as for the analysis of the test results of a circuit as a function of the historical record of its fabrication.

Results Attained

Background

The past 5 years have enabled the CNET-Grenoble Pilot Lab to progress from the startup stage to an enviable operational level. To reach an adequate level rapidly, we first transferred an NMOS technology from National Semiconductor (United States) with all the elements needed to realize a static 4K memory (2114B). By this means we were able to validate our facilities by way of a previously proven hookup and circuit. However, the stabilizing of this technology would have required an outlay that was incompatible with our development plans. Beginning in 1982, therefore, we developed a 3-micron NMOS line specific to our Center, which was more easily testable. This technology was retained as a reference for our production room until 1985. Concurrently, we studied increasingly higher-performance technologies, progressing from 3 microns in 1982 to 1 micron in 1985, and including increasingly

sophisticated stages (silicide, transitory annealing, two levels of interconnection, ...). Despite a very ambitious calendar, schedules have been met, and the realization of a 1.5-micron CMOS 16 x 16 matrix is there to attest this. [see boxed item 5].

Individual Techniques

To improve the density of integration of the circuits, the technologies have sought to reduce the minimal dimensions of the patterns. Figures 4 through 7 [Figs 5, 6, 7 not included here] illustrate a few examples of the CNET-Grenoble Pilot Lab's present optical lithographic possibilities: The tools are in place for the realization of a 1-micron technology; Developmental efforts are of course being expended on the quality of the image obtained, but also on problems that come to light only in the processing of numerous batches of boards: Effect of the homogeneity of the layers, owing to underlying relief (hence the use of multilayer photosensitive resin systems which "absorb" the relief), and effect on etching and on succeeding stages. But the pattern dimension is not the sole measure of a high technological level. Figure 8 (not included here) synthesizes /a few [in italics]/ of the results leading to a real 1-micron technology.

--High-performance-circuit MOS transistors have a polycrystalline silicon grille short-circuited by a metal; we use a structure of very-low-resistance (34 ± 4 micro-Ohms per centimeter for 1,277 circuit measurements, which is comparable to the best results published) etched at 1 micron;

--Lateral insulation between components poses major problems near the 1-micron level, particularly in the case of CMOS's. One solution among those tested at CNET is to cut a deep trench between transistors, thus limiting the possibilities of electrical leakages;

--Two levels of metallization are necessary in complex circuits for interconnecting the components. The technologies developed in the Pilot Lab hold promise for the attainment of an unprecedented density with systems in conventional use, subject to controlling the shaping of this metal (rounded corners, chamferred edges);

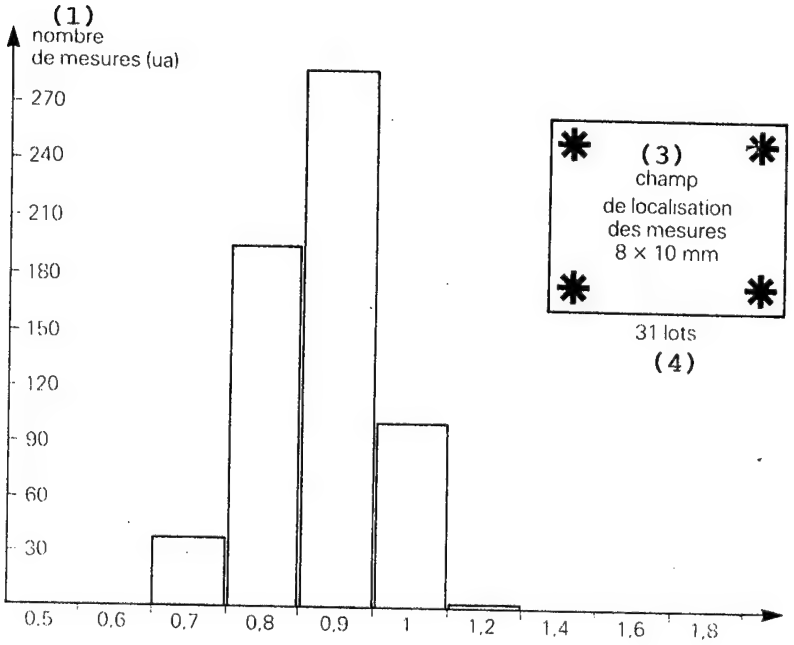
--Since these metal lines must be brought into contact with the lower levels of the circuit, contact "holes" must be created, very small ones, of course, but with very precisely controlled rounded edges to permit the interconnection to drop through the "sleeve" thus formed. This requires very elaborate etching techniques in a reactive plasma (involving up to four different gases), followed if need be by a fast annealing (a few seconds) at a very high temperature (over 1,000 degrees C).

Circuits

For an industrialist, the fabrication and marketing of circuits are his reason for being. For the CNET-Grenoble Pilot Lab, no sales notion whatever is associated with the realization of these chips. Nevertheless, it is important to take things all the way to the finished circuit. In effect, this is the only way:

Fig 4

Lithographic Performance Evaluations



The CNET-Grenoble Pilot Lab's photolithographic facilities enable the obtaining of 1-micron circuit-patterns. Note the number of samples used to validate the test measurements. (Document provided by B. Latombe et al.)

Key:

1. Number of measurements (ua [not further identified]).
2. Practical resolution at level of grille (microns).
3. Field of localization of measurements - 8 x 10 mm.
4. 31 batches.

-For the technologist to recenter the development of techniques and arrays on concrete and useful problems (many cases pass unperceived on test hookups, which never approach the complexity of a real circuit);

--For the Pilot Lab to achieve an undistorted notion of the efficiency and quality of its work;

--For the designers to validate ideas interactively with technology.

Boxed item 6 provides a synopsis of the circuits developed by CNET-Grenoble in its Pilot Lab: As can be seen, we thus respond equally to in-house as well as external needs; in particular, we have been able to develop multi-project circuits for the University, designed by students, who otherwise could hardly have gotten to know the results of their work.

Figure 10 [caption only] shows an example of a complex circuit diffused in our production room: This is a microprocessor circuit for signal processing, containing around 70,000 transistors.

Conclusion

In 5 years, the CNET-Grenoble Pilot Lab has become a major factor in the program to close our technological gap in the domain of microelectronics. Thanks to a motivated staff and substantial funding, it has been able to put in place the elementary stages towards realization of an advanced 1-micron CMOS technology. In addition, it has proven, through the development of circuits, that these individual techniques are things beyond mere laboratory curiosities; in this regard, control and reproducibility are as important as the demonstration of feasibility, a necessary condition for interesting the industrialist in our work. And lastly, it has validated the very idea of a pilot lab in a state-operated laboratory, to the point where the People's Republic of China has considered that a center like that of the CNET-Grenoble fits perfectly into its concept of microelectronics developmemnt: The PRC is currently negotiating with the French PTT for the purchase of such a laboratory. [End of main article; boxed material and captions follow]:

[Boxed item No. 2, p 8]: Features of the CNET-Grenoble clean room environment:

--Clean room area 1,090 m^2, consisting of:
- 160 m^2 of Class 100 (laminar flows, work zone);
- 610 m^2 of Class 1,000 (personnel traffic zone);
- 320 m^2 of Class 10,000 (technical maintenance zone).

--Air conditioning: 45,000 m^3/hr of fresh air;
- Air inside clean room: 22.0 ± 0.5 degrees C; humidity 45 ± 5 percent;
- Over-pressure: 1-2 mm of water.

--De-ionized water: 60-75 m^3/day at 17-18 megohms resistivity at output from the plant.

--Gases: Nitrogen 400,000 m^3/yr
Oxygen 3,500 m^3/yr
Hydrogen 900 m^3/yr
and various special gases.

--Chemical products (liquids): Up to 400 liters in stock for some.

--Specific treatment of liquid and gaseous wastes.

--Automated installations, with centralized control and multiple fail-safe devices.

[Boxed item No. 5, p 12]: Some characteristics of the CNET-Grenoble 1.5-micron CMOS logic array:

Technological Characteristics

--n-type substrate
--oxide 25 nm
--silicide grille WSi_2 + Si poly
--channel length 1.2 microns
--contacts 2 x 2 microns
--one level of metal
--stepping photoreducer + projection 1:1
--plasma etching
--fast annealing

Validation Circuit

--16 x 16 switching matrix
--bit-rate:
nominal 108 Mbits/sec
real up to 160 Mbits/sec
--current consumption:
nominal 80 mA
real 55 mA
--distortion (at 100 Mbits/sec):
nominal 1.0 nanosecond
real 0.2 nanosecond

[Boxed item 6 follows on next page]

[Boxed item No. 6, p 12]: Some circuits diffused in our CNET-Grenoble Pilot Lab:

3-micron NMOS:

--coder
--decoder
--multiplier
--adder
--floating-point multiplier
--liquid crystal addresser
--signal-processing microprocessor
--bus arbiter (for SM90)
--frame extractor (for CNET-Rennes)
--multiple-project circuits (for the University)

1.5-micron CMOS:

--16 x 16 switching matrix

Telecom CMOS:

--video decoder
--digital-analog converter
as well as numerous simpler circuits (test circuits, oscillators, etc).

PHOTO CAPTIONS

1. p 5 Michel Brillouet, born 24 April 1952, alumnus of the Ecole Polytechnique and ENST graduate engineer. He joined the CNET at Lannion in 1976, where he took part in the development of software for remote infrared spectrometry. Transferred to CNET-Grenoble in 1979, he is now head of the Depositions, Heat Treatments and Implantations Department of the Pilot Lab there.

   Mr Brillouet also participates in the European ESPRIT program, and serves in loco parentis with respect to work on the SPECTRE program for the development of CMOS technologies.

2. p 13 [Figure 10] The circuit [of this signal-processing microprocessor] contains around 70,000 transistors and is fabricated using a 3-micron NMOS technology.

9399
CSO: 3698/669

WEST EUROPE/MICROELECTRONICS

ALCATEL LEADS ESPRIT IMAGE-CODING PROJECT

Paris ELECTRONIQUE ACTUALITES in French 9 May 86 pp 1, 9

[Article by D. Levy]

[Text] A group of six European companies, led by Alcatel, has just been awarded a study contract under the Esprit program, regarding the coding of fixed and animated images. Aimed essentially towards videoconference applications, this study will enable the six partners to define a level of standardization and compatibility for the manufacture, by each of the builders, of future codecs [coder/decoders] operating in the range between 64 and 256 Kbits/sec. For the Europeans, this means doing again, within a new speed range, what they succeeded remarkably in doing in the case of the 2-Mbits/sec codecs: Adopting standards designed to make the different industrial products compatible--something neither the Americans nor the Japanese have yet been able to do.

Most of the current openings for image-compression systems are in videoconferencing, although the cost of high-bit-rate links still limits the market. Various industrial initiatives have led to the development of codecs operating between 786 Kbits/sec and 2 Mbits/sec. These initiatives have been marked by an absence of coordination at the level of standardization, with the exception of the EEC (COST 211), which rallied European builders (notably Alcatel, SAT and GEC) around a 2-Mbits/sec color codec standard. This European hard core was thus able to effectively block the efforts at penetration by the Japanese and Americans (more oriented towards 1.5 Mbits/sec).

Today, the advent of 64-Kbits/sec switched channels (RTC 64 and Telecom 1 in France, for example) is calling for the industrialists to develop codecs operating at these bit-rates. With cheaper links, the market can be expected to grow substantially. Hence the awarding of a study contract, under the EEC's Esprit project, to six European industrialists, with a view to defining a level of standardization and compatibility for the future codecs operating between 64 and 256 Kbits/sec.

In addition to Alcatel, which is acting as leader, the European group includes SAT, SEPA (Italy), GEC (United Kingdom), Tekade (German subsidiary

of Plilips) and Telefonica (Spain). This group is thus going to establish common standards for the new bit-rates, which will then enable each builder to develop codecs capable of "dialoguing" with those of the other European partners. Besides videoconferencing, which is expected to blossom after 1990, the new codecs will be able to find applications in business videophone service and particularly in surveillance services.

9399
CSO: 3698/669

WEST EUROPE/MICROELECTRONICS

NORDIC PROJECT ON SURFACE MOUNTED COMPONENT SOLDERING PROBLEMS

Stockholm MODERN ELEKTRONIK in Swedish 18 Aug 86 pp 18-19

[Article: "Solderability of Surface Mounted Components"]

[Excerpts] If all goes according to the drawings, late this year the Institute for Metal Research (IM) will begin a large-scale research project on the solderability of components for surface mounting. The project was initiated by electronics manufacturers who are having more and more problems with soldered joints, which are becoming smaller and more numerous. At the same time, higher requirements are now being placed on the electrical, heat-transfer, and power-handling capabilities of soldered joints.

For about 5 years the Institute for Metal Research has conducted projects in the field of soft soldering for electronics. Some of these projects have also involved the soldering of surface mounted components. Researchers have examined the formation of metal layers, solderability, and solder defects. Results from these studies have been published in three reports (Metallographic Analysis of Some Solder Joint Defects, Effect of Temperature and Power Cycling on the Solder Joint between Substrate and Chip Carrier, and Metallographic Examinations of Soldered Surface Mounted Chip Components).

IM is continuing to work in these directions. During the next 3 years the institute will conduct an extensive research program including the following subprojects:

Fatigue (will utilize about 30 percent of the program's resources;

Solderability tests (25 percent);

Metallography of solder joints and layer formation (20 percent);

Soldering of gold and dense gold layers (10 percent);

Monitoring of solder joints (10 percent);

Examination of defective soldered seams (5 percent).

Assuming that sufficient funding is obtained, toward the end of the year IM will begin a project that will concentrate on the solderability of components for surface mounting. It has been proposed that this work include the following subelements:

> Examination of solderable layers, geometries, and dimensions (for components);
>
> Development of objective solderability testing methods;
>
> Monitoring of solderability;
>
> Examination of the relationship between solderability and layer formation.

The project will probably concentrate on developing a good method of testing for solderability. The fact is that there are several methods, but none of them are especially good. Differences in the appearance and arrangement of the components make some suitable for one method and others suitable for other methods. Developing one good general method would represent a major step forward. Consequently, IM will study the previous methods and examine in greater detail how various types of solder are wetted on various types of component connections. Then the researchers will attempt to develop a good general method. This is a major project that will take a long time. It is estimated that it will take about 2 man-years.

Preliminary Project

It is impossible simply to begin a project of this magnitude with no preliminary work. As a result, the institute has sought and obtained funding for a preliminary project that will be carried out this fall. The main purpose of the preliminary project is to develop a plan for the main project. The preliminary project will also include a study of the literature on solderability. The institute will then contact a large number of Nordic companies in order to gather more information and to broaden the economic base of the main project.

Contacts

The Institute for Metal Research will seek various types of contact with companies that are affected by problems in the solderability of surface mounted components. As part of this effort, the institute had an exhibit on Surface Mounted Component Day at the EP 86 exhibition last spring, at which the institute announced its activities. Questionnaires were distributed and 25 responses were received. It was found that, of 16 companies that used surface mounted components, 12 have problems with soldering.

Nordic Cooperation

The IM project on the solderability of surface mounted components should be seen as a Nordic project and IM is directing its questionnaire toward

companies in all the Nordic countries. The solderability project was initiated by the Norwegians. It is also Norwegian engineers who have clearly pointed out the problems involved in soldering surface mounted components. In addition, there is Norwegian money in the picture. As an example, the preliminary study mentioned above was made possible in part by funding from the Nordic Industrial Fund.

The Institute For Metal Research

The Institute for Metal Research is an industry institute that works on research assignments, primarily for the steel manufacturers. In recent years, the institute has accepted more and more assignments from material users. For about 5 years the institute has also conducted research in the field of soft soldering for the electronics industry. This work involves primarily metallographic studies and, in this way, differs from the connection experiments that are conducted by the Institute for Engineering Research (IVF) in Goteborg.

IM, which is located right beside KTH (Royal Institute of Technology) in Stockholm, is an independent foundation. The activities of the institute are financed in part by STU (Board for Technical Development) and in part by industrial companies. Results from projects funded by STU are public. The list of reports on soft soldering now includes about 15 titles.

IM activities are financed in three different ways:

Collective financing;

Partly collective financing;

Financing on commission.

Collective financing refers to projects based on annual fees from STU and from industrial companies.

Partly collective financing is applied to projects initiated by interested or underwriter companies. These companies put up 60 percent of the costs and STU contributes 40 percent. The IM soft soldering project for the electronics industry is one example of a so-called partly collective project.

Financing on commission applies to projects that IM carries out on behalf of an individual client. The results of these projects are reserved for the client in question.

9336
CSO: 3698/676

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

EEC R&D BUDGET 1987-1992 PROPOSED

Paris LE MONDE in French 29 Jul 86 p 20

[Article by Philippe Lemaitre: "Brussels Proposals for the Years 1987-1992--Fr 52 Billion for European Research"]

[Text] Brussels (European Communities)--The Brussels Commission and its President Jacques Delors in particular are convinced that technological cooperation is one of the keys to reforming Europe. As the heads of state and government themselves had already noted when they approved the "Acte Unique" [Single European Act] in Luxembourg at the end of 1985, which serves as the charter for Community development in the coming years, this stronger technological cooperation must be considered as complementary to the "large market without borders" which the 12 countries have decided to create by 1992.

Recently the European Commission initiated the comprehensive Community research and technological development program for the 5-year period 1987-1992. This proposal, transmitted to the member governments on 24 July, takes into account their remarks and criticisms of the preliminary draft of the project which was submitted a few months ago. Within the Brussels Commission itself, Delors had to persuade his colleagues of the need to be realistic in order to overcome the reticence of the three major member states, the FRG, France, and the United Kingdom, which were strongly opposed to the preliminary draft of the project because they found it both too ambitious and too confused.

The text submitted to the 12 countries stresses that the EEC must remain selective in its actions. Indeed, this kind of prudence is all too often neglected: Account should be taken of the fact that "member states pursue national policies which they think, rightly or wrongly, should continue to be the central point of their action." This selectiveness is also needed to understand the other forms of cooperation which have been organized at the European level. The Commission cites the European Space Agency, CERN [European Center for Nuclear Research], the European Science Foundation, the Council of Europe, and also emphasizes the complementary nature of EUREKA to the Community programs.

However, the effort to be realistic in this time of restrictions is mostly visible at the budgetary level. In its preliminary draft of the project the Commission requested 10.3 billion ECU's, i.e., Fr 70 billion, over 5 years. The revised project provides for credits limited to 7.7 billion ECU's, i.e., Fr 52 billion. This is still certainly more than the 6 billion ECU's that the United Kingdom, France, and especially the FRG, the most restrained member state, have in mind, but the difference has become small enough to get things moving. It is not the objective of the overall program, which must be adopted unanimously by the 12 countries, to go into details. This will be the task of the operational programs which will follow and which will be approved by a qualified majority, in accordance with the provisions in the "Acte Unique".

Eight Action Themes

The proposal, nevertheless, lists eight action themes: 1. The quality of life with health and environmental programs; 2. "Towards an Information Society": This involves essentially a further development of the ESPRIT program on electronics and information. This is the biggest expense, 2.05 billion ECU's (Fr 14 billion); 3. "The circulatory system of the large market," i.e., telecommunications; 4. The use of new technologies in modernizing industrial sectors; 5. The continuation and conclusion of programs in energy, including 1.1 billion ECU (Fr 7.5 billion) for thermonuclear fusion; 6. Biotechnology; 7. The exploitation of ocean depths and marine resources; 8. European scientific research community.

As Karl-Heinz Narjes, vice president of the Commission in charge of research, stressed, 60 percent of the requested credits will be used to increase competitiveness in the Community's industry.

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CSO: 3698/A208

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

EC COMMISSION'S R&D PROFILE, 7.7 MILLION ECU TILL 1991

Zurich NEUE ZUERCHER ZEITUNG in German 5 Sep 86 p 17

[Text] The EC Commission recently presented the council of ministers with its proposal for the joint framework program for research and technological development for the period 1987-1991. This is intended to provide a guideline for the planning of individual programs as well as a political impulse for a significant increase in EC research activities. Deliberations in the council of ministers are likely to center primarily around the financing of this framework program.

The idea of making a technology community out of the EC is at the present time one of the favorite notions of the Brussels commission. Not much public acclaim can be garnered with the joint agricultural policy, the major pillar of the EC, because of extremely costly surplus problems. Structural policy, which is the second most important sector in terms of financial costs, is popular primarily among the receivers of the corresponding funding, but is regarded by others as an onerous, even if unavoidable, act of solidarity on behalf of the poorer regions in the Community. The situation is different in the case of funding for research and technology. It is the firm conviction of the EC Commission that here there is a broad field in which better results could be achieved with more common actions and therefore that some plus points could once again be gotten from the citizens.

New Legal Basis

For its ideas concerning the intensification of joint activities in the area of research, the Commission has just ensured the political backing of the heads of state and government. At the Milan summit in June 1985, it was decided to give the EC a new technological dimension. In the government conference on the revision of the EEC treaty, this readiness was expressed in provisions which in twelve articles stipulate the strengthening of the scientific and technological basis of European industry as a new goal of the Community.

One of the most important instruments in achieving this goal is the creation of long-term framework programs, in order to determine scientific and technological goals as well as their respective priorities and to outline the major directions of the proposed activities. In addition, this framework

program must define the financial requirements and allocation of funding to the various sectors. The EC Commission has now presented the council of ministers with a framework program in keeping with the new treaty stipulations for the years 1987-1991 for discussion and passage.

Controversy Surrounding Financing

The most obvious difference between this proposal and the first and to date only framework program (1984-1987) is the amount of funding that has been proposed. In 1983, the Commission requested 3.75 billion European Currency Units (1 ECU = Fr 1.70) for a 4-year program--the value was never approved by the council of ministers, however, but only duly noted; this time it regards 7.7 billion ECU for 5 years as necessary, with the possibility of increasing by 15 percent after half of the term. The Commission's original proposals were actually a figure of 9 billion ECU (+15 percent), but this figure encountered vehement resistance, above all from Germany, Great Britain and France in the hearing before the presentation of the final proposal.

The coming discussions in the council of ministers--passage of the framework program is expected in December--will also undoubtedly deal above all with the suitable financing of the research and technology activities of the Community. Various aspects will play a role in this. In the first place, the Community has general budgetary problems, a fact which causes countries such as the FRG, France and Great Britain to be generally cautious with regard to decisions on new expenditures. Furthermore, the member countries of the Community are guided by differing interests. An opportunity is presented here for smaller countries with limited economic and innovation strength to participate in new developments which would otherwise exceed their possibilities. The large and powerful member states, on the other hand, are more able to carry out specific projects on their own account and with alliances, from case to case.

Finally, there is also the central question of whether community activities which cross frontiers really promise a priori more efficiency and success than courses pursued independently by the different nations. The English in particular are of the decided opinion that one more research franc in the EC should be compared not only with the additional benefit, but with the benefit that this franc could bring when used for a different purpose, not only in the area of research. In any case, it is expected that the financial proposals of the Commission will ultimately not be accepted by the council of ministers to their full extent. The volume that is finally approved, however, will have to show how serious the qualitative statements concerning the expansion and the support for Community research really were.

Still Relatively Vague Structures

As far as allocation of the financial resources to individual areas is concerned, the Commission has remained relatively vague for tactical reasons. While the framework program has to be unanimously approved by the member states, a qualified majority suffices in the case of the specific sub-programs. For this reason the Commission would prefer to avoid having too many details spelled out in the framework program itself. Nonetheless, the Commission has proposed that funding be distributed to eight different areas

(cf. Table), which are intended to represent a binding framework of priorities. The Commission will decide at a later date how these funds are to be further distributed to individual special programs. After passage of the framework program, the Commission will then quickly present its proposals for the special programs.

If one takes a look at another distribution of funding, one notices a strong rise in expenditures for measures intended to enhance the increase of industrial competitiveness. In the four years prior to 1982, 16.9 percent of total expenditures were used for this purpose; in the framework program 1984-1987, 28.2 percent were provided--the effective value will be higher--and in the coming five years no less than 60 percent is to be spent for this purpose. On the other hand, energy research has clearly dropped in terms of relative importance; from a previous approximately two-thirds, only about one-fifth is provided for this sector in the period 1987-1991.

Parallel to this shift in priorities, an increasing importance of the so-called cost sharing actions can be noted. Programs such as ESPRIT, RACE and BRITE are ordinarily funded 50 percent by the Community and 50 percent by the participating industry. Such projects generally affect the pre-competition area, lie therefore between basic research, which is totally financed with direct actions by governmental offices and actual product development, for which the Community does not regard itself as responsible, prefering to leave the field to the EUREKA initiative.

Open to the Outside?

The framework program is quite reticent with regard to the relationship of the Community in research-related matters and third countries, particularly to the members of EFTA: it simply speaks of an intensified international cooperation. In contrast to the offices responsible for foreign relations, those on the EC Commission responsible for research regard an opening to the outside without any great enthusiasm. The work of the mixed committees for the implementation of the framework agreement concerning scientific and technological cooperation between the EC and the individual members of EFTA will have to show to what extent opportunities for participation will truly be created. The council of ministers has yet to take a position with regard to this question.

Allocation of EC Research Funds
(Commission Proposal for 1978-1991)

	in million ECU (1)
1. Quality of life	
Health	150
Environment	425
2. Information technology (Esprit) (2)	2050
3. Important sectors for the completion of the internal market	
Telecommunications (Race) (2)	800
Integration of telecommunications, information and audiovisual technologies	300
Transportation	20
4. New technologies in the industrial sector	
Manufacturing technology (Brite) (2)	500
Materials and raw materials	370
Technical norms, measuring, reference materials	240
5. Energy	
Nuclear fission	580
Nuclear fusion (JET) (2)	1100
Non-nuclear energy and rational energy use	210
6. Biotechnology, use of agricultural raw materials, agro-industrial technologies, science and technology in the service of development	450
7. Research and utilization of the oceans	80
8. Europe of the Researchers	460
TOTAL	7735

(1) ECU=FR. 1.70. (2) References in parentheses to program or project names mean that a large portion of the indicated funding is earmarked for the corresponding activities.

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CSO: 3698/699

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

SWEDISH BASIC RESEARCH IN 1990'S THREATENED

Stockholm KEMISK TIDSKRIFT in Swedish No 8, Aug 86 pp 10-12

[Article by Kenneth Leverbeck]

[Text] Less and less basic research and fewer doctoral candidates can be expected between now and the 1990's. The reason for this is not only the low wages at universities, but also the entire direction of research policy. This bleak picture of the future was drawn by three researchers in Uppsala.

The three researchers who are warning of the bleak future of basic research in Sweden are Professor Torkel Wadstrom, Assistant Professor Leif Isaksson, and Professor Kurt Nordstrom of the Biomedical Center (BMC) in Uppsala. Something must be done soon. Wages are important, but our entire research policy is also important. The chances for a young researcher to make a breakthrough in a new field are almost nonexistent today.

"As an example, if you want to study AIDS or forestry research you will have no problem obtaining money. But if, as a young researcher, you want to start your own basic research, it is almost impossible," Leif Isaksson said.

According to him, the reason is that allocations from the governmental research councils have remained the same since the early seventies, while research costs have increased. There are some "islands" of research groups that have managed to survive.

"The only chance a young researcher has is to join a well established group under a professor who has a firm position as a researcher."

"We must make a strong investment in basic research, otherwise our applied research will be worse and worse," Torkel Wadstrom said.

In the long run, weak basic research will also affect industry, since there will be no new knowledge from which to develop new products. The Uppsala researchers believe that many politicians have too much confidence in the proposition that research can solve social problems. This was how sector research developed.

This reasoning was false, they said. "Basic research cannot be managed in this way. In addition, we do not know what knowledge we will need in the future." Kurt Nordstrom mentioned heart transplants as an example.

In a study that was designed to find out what discoveries were important for this technology, it was found that at least two thirds of these discoveries had been made without a thought given to heart transplants, but for entirely different purposes or for no purpose at all, out of sheer curiosity. In other words, without these discoveries transplants would not be possible today.

Flight To Industry

Another problem for the future of basic research is the decline in doctoral candidates and qualified laboratory assistants, more and more of whom are going over to industry.

"Research groups have been dissolved and others have moved to the United States. The difference in wages between the university and the industry is decisive in this flight from the university," the Uppsala researchers said.

"It is difficult to get people into research training. In addition, after 2 or 3 years a project leader must fear that his doctoral candidates will accept jobs in industry."

After about 3 years a doctoral candidate is of great interest to the industry and, in addition, industry can offer much higher wages than the universities can provide.

"Those who quit are not the ones who have begun to prepare for their dissertation defense. All the ones I have had who came that far received their degrees," Leif Isaksson said.

"The situation is worse when it comes to skilled laboratory assistants and doctoral candidates I have hired with extra project money."

"The students see how researchers in the in-between stage must fight for a living. They are simply scared away," he said.

Lab Assistant's Wages

A doctoral candidate is usually 30 years old by the time he defends his dissertation. Then there are several years at a foreign university before, in the best case, he can establish his own research group. By that time he is 35 or 40 years old.

"Many young researchers have families that must take a back seat during those years."

Leif Isaksson told of a research colleague, 37 years old, who received his degree 5 years ago and recently returned from 2 years of research in the United States.

"That researcher receives the same pay as his laboratory assistant, who is the same age. It becomes totally absurd when you make comparisons of this type," Leif Isaksson said.

"Under such conditions, it is difficult to operate a research group. The work lacks the proper dynamics. Eventually, when there are fewer and fewer researchers in the group and a 'critical mass' has been reached, it becomes impossible to conduct any meaningful research."

"Another thing we must not forget is that a project leader must seek funding in accordance with developments in his own field of research."

"But if it is difficult to get people to work, then there is no point in seeking money either," Leif Isaksson said. This means that a project leader will become conservative about beginning new activities. Fewer and fewer new projects are started.

"In the long run, this will affect the industry as well. After all, the university must train a surplus of students, so that only a few of the best can continue their studies. What we are doing now, however, is to train precisely the number that are needed. In other words, the selection process is not working."

Low Industrial Competence

Torkel Wadstrom is a researcher at the Department of Veterinary Medicine at BMC.

"It is impossible to get a young veterinarian to devote himself to research in basic areas, i.e. basic research, because our wages are so low."

"The serious problem is that research is not seen as training. The industry is calling for veterinarians trained in research, but it is not getting competent people."

"There are some large Swedish companies that cannot conduct joint research with the universities, because they cannot communicate with the researchers."

"It is extremely important to invest in training researchers and to increase the level of competence in this country. We must reverse the trend. Being a researcher must be considered positive."

"The training of researchers must be accepted both within the industry and at governmental agencies."

Work Morale Declining

The Uppsala researchers believe that increased wages could be an important "carrot" in this connection.

"People laugh at the wages we receive as professors," Torkel Wadstrom said. They advise us to take a second job if we are dissatisfied with our wages."

"But how can we increase our wages by working as consultants if, at the same time, we have a full-time job leading a group of researchers at the university?"

"Work morale at the university is declining at present," he said. "It is extremely important that a group leader in a project not have four or five other tasks to perform. This is common on the continent, but it is not good. The professor must concentrate on his own task."

The research councils must receive more money, according to the researchers in Uppsala. They also want a graduated income scale for researchers in training, where either the research councils or the universities would increase wages.

"We must have a fair wage system within our research groups," Torkel Wadstrom said. In his group, he has veterinarians and civil engineers, two medical doctors, two philosophers, and an agronomist. As a result, wages are not based on previous education.

"There are people in industry who believe the universities will have an extremely difficult time if we do not invest in basic research," Torkel Wadstrom said.

"Introduce flexible wages and incentives for those who are talented, but have not had so much training."

Those who have received their doctorate should not have to move to the United States. They must be able to stay." Torkel Wadstrom is convinced that there are people in the industry who are prepared to invest money in this, in the form of donations and the like.

Extra Wages To Wrong Researchers

One recently introduced measure is the so-called market wage supplement (MLT), a wage bonus for researchers and other government employees who are attractive to the private sector. MLT was introduced so that not all skilled workers would go over to the industry.

"But a pure basic researcher cannot receive MLT," according to Leif Isaksson. "Those who receive this wage supplement are usually those who are also best suited to work in industry."

"Thus, basic researchers not only have difficulty obtaining funding, but also receive systematically lower wages in basic research than they would in applied research and industry. University workers have the very lowest wages of any government employees," he said.

"The situation for a basic researcher today is that he is given the stick if he remains at the university and the carrot if he leaves," Leif Isaksson said.

Point System For Researchers

Torkel Wadstrom advocates the Canadian system or the system used on the continent, which employs a merit system for researchers.

The merits of our research groups should be evaluated, he said. This system is now being introduced at the Karolinska Institute in Stockholm.

"We could introduce a simple point system that would reflect how many good doctoral candidates the group has produced, what research it has done, its publications, courses, seminars, etc. In other words, we could have a point system that would indicate the relative merits of various research groups."

"That would be useful to Sweden," Torkel Wadstrom said. "As they say in Canada about Sweden: You have good hockey teams, so it seems reasonable that Swedish research should be evaluated to which research 'players' are best and how their doctoral candidates are doing."

A Large Industrial Fund

Leif Isaksson sees three great risks with having private business take over research funding. The first is that the industry prioritizes investments that do not always agree with the goals of science. The second danger is that the government could begin to reduce its appropriations when it sees that industry has stepped in.

"The third danger is that industrial money could destroy basic research by taking people away from the project group."

"The industry should have sense enough to establish a sizable industrial fund of several hundred million kronor. Put this money in the hands of the research councils, which would then examine the projects using scientific criteria. That would be a genuine contribution," Leif Isaksson said.

"At present, there are several so-called experts with minimal experience in research out in industry who decide which researchers at the universities will receive money from industry."

"They have no feeling for where the future lies in the world of research."

The Uppsala researchers fear that, in the long run, there will be less and less research in Sweden. They warn against short-sighted investments that seem interesting today. This money goes to project groups that are already well established.

"They deserve money, since they are doing well," Leif Isaksson said. "But that affects the new projects that never get a chance to survive. In the nineties, we may have only a few areas in which we are conducting research."

Disparate Research Also Important

"The Swedish chemical and pharmaceutical industries are good at research because the leaders of these companies were trained at Swedish universities," Torkel Wadstrom said. "If we are going to invest in biotechnology, we must have broad-based research at the universities."

"We must have odd projects, as well. Just look at AIDS! Several years ago there was a project to study feline AIDS. All the veterinarians laughed at the project, but suddenly it became extremely interesting."

"There are many examples of basic research that may seem disparate, to the extent that it is stopped and the money is shifted to other 'more interesting projects.' This way of thinking is extremely dangerous to the entire country, in the long run--especially from the standpoint of the national economy."

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CSO: 3698/676

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

FRG INFORMATION TECHNOLOGY: MORE BASIC RESEARCH URGED

Duesseldorf VDI NACHRICHTEN in German 29 Aug 86 p 1

[Text] Research funding in the field of information technology is to be concentrated more on the expansion of the research infrastructure and direct funding of industry is to be further reduced over the coming years. This is the basic point of a framework concept presented last week by research minister Dr. Heinz Riesenhuber for the strengthening of basic research in the field of information technology.

As Minister Riesenhuber explained, German industry has in a very short time been able to close the gap with the United States and Japan in the field of information technology; now it is a question of strengthening the basis for the long-range future. And this, he said, can only be achieved through top research results.

For this reason, his plan calls for increasing the number of scientists in the FRG who work in the field of information technology from the present figure of 1700 to more than 4,000 by 1992.

According to Riesenhuber's plan, this is to be accomplished in several ways: in the first place, the activities of the large research institutes are to be expanded in the direction of information technology.

In addition, project support is to be shifted from technical titles in the research ministry to topics in the preliminary field of industrial research and development. Moreover, university personnel is to be strengthened with project support by appropriate federal funding.

And finally, the question is still being studied of to what extent industry is prepared to participate in sponsoring and financing special research organizations, particularly institutes for a given period of time.

12792
CSO: 3698/699

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

NETHERLANDS MINISTER CALLS FOR S&T BUDGET INCREASE

Amsterdam COMPUTERWORLD in Dutch 10 Jun 86 p 5

[Unattributed article: "Minister Deetman in Political Testment--'More Money to Eliminate Technology Lag'"]

[Excerpts] The Hague--Minister of Science and Education Deetman wants a considerable amount of money to be made available during the coming cabinet term to eliminate the Netherlands' technology lag in the fields of S&T and data processing. In a wish--list political testament--that Deetman sent to Mr De Koning, who is charged with forming the new government, Deetman speaks of a "major" sum and of a considerably greater financial effort.

Deetman deems it vitally important for the future of our country that education prepare high school and university students for a society deeply influence in nearly all its aspects by data processing. Therefore, the outgoing minister urges that the computer policy be continued vigorously.

He points out to De Koning that by 1990 an annual class of at least 7,500 high-level information scientists must be graduated. To that end, training facilities must be considerably increased. In addition, there must be enough qualified personnel to provide this training.

Minister Deetman calls for a substantial effort to increase the quality and quantity of communications and data processing infrastructures. This effort must be such that the Netherlands' entire research potential and the training of computer specialists can reach an internationally competitive level.

The basis for this is the SURF plan, which was developed by the university community, the agricultural institutes, TNO [Netherlands Central Organization for Research], the PTT [Post, Telephone, Telegraph], and the business world. The cabinet recently acclaimed this plan following the advice of the Pannenborg Commission.

Nationwide Network

The minister thinks that a substantially larger financial effort should be made to develop a nationwide network based on local networks and to provide specialist facilities and centers of expertise. Also, HBO [Advanced Vocational Training] schools should be brought up to date in all ways in the data processing field.

In his political testament Deetman points out another bottleneck in data processing technology: the development of software and courseware, teaching curricula, and STET. The Data Processing Stimulation Plan (INSP) allocates a total of 270 million guilders for this purpose over the 1984-1988 period.

However, Deetman says that we can already see that a substantial increase will be needed for the period 1987-1990.

The former minister is also worried about the great shortage of modern equipment in Dutch training institute: "A major investment will be necessary under the next government to update our inventories and purchase state-of-the-art educational equipment." Our lag could thus be overcome within 4 to 5 years.

However, to maintain that level, inventory allocations will have to rise substantially and permanently, says the minister. For vocational training he advocates the establishment of regional centers equipped with advanced facilities. The minister thinks that not only the government but also the business world should invest in this.

It is quite clear to him that purchasing modern and advanced educational equipment will have a great impact on refresher courses for teachers and on curriculum development, which will also have "far-reaching financial consequences."

The political testament--an odd expression because Deetman will very probably be part of the next cabinet--will play a part in the negotiations between De Vries and Nijpels while forming a new CDA-VVD cabinet.

However, Minister Deetman is not likely to see all his financial wishes for S&T and data processing fulfilled in the new government's policy agreement, especially since his political testament hardly mentions budget cuts--which Minister of Finance Ruding wants.

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CSO: 3698/A186

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

BRIEFS

DUTCH S&T COMMISSION--Former Phillips President Dr W. Dekker will chair a commission which will advise the Netherlands government on a new approach and new structure for its technology policy. According to the government coalition's policy agreement, the commission must make its recommendations within 6 months. The government believes that "increasing industrial R&D now requires increased support from government technology policy." Among other things the commission will define the goals of a future technology institute which will streamline the information technology policy of the government. [Text] [Amsterdam COMPUTABLE in Dutch 1 Aug 86 p 1] 25023/13045

FRG PLANS TECHNOLOGY OFFICE--A standing "Bundestag Commission for the Assessment and Evaluation of the Consequences of Technology" was proposed by the task force "Technology Assessment," which was set up in March of last year, in a report presented by Chairman Josef Bugl (CDU) last Friday to Bundestag President Philipp Jenninger. The commission is to consist of Bundestag members and experts. In order to support its work, a scientific office is to be established at the Bundestag administration. This office is to commission studies, sponsor technical congresses and prepare findings for the commission. The cost is estimated at an annual DM 10 million. A systematic evaluation of the impact of new technologies may be able to help avoid unnecessary economic and social costs to a considerable extent, according to the 70-page report of the commission, in which all parliamentary parties are represented. This could also help to counteract continued loss of confidence in parliament on the part of segments of the population. According to the report, the Bundestag is just beginning to take up a role that is appropriate to the growing importance of science and technology. Like parliaments in other countries, it has "not kept up to date with regard to science, the economy and the executive branch and the expertise and financial volume available in these areas." [Text] [Munich SUEDDEUTSCHE ZEITUNG in German 12 Jul 86 p 5] 12792

CSO: 3698/703

WEST EUROPE/TECHNOLOGY TRANSFER

SWEDISH EXPORT OF NUCLEAR WEAPONS TECHNOLOGY TO BE CURTAILED

Stockholm NY TEKNIK in Swedish 14 Aug 86 p 2

[Article by Jan Melin]

[Text] India will not be allowed to purchase Swedish X-ray flash units, since they can be used to develop nuclear weapons. This was decided by the Swedish government, which pointed out that India had not signed the non-proliferation pact.

Just over 1 year ago Scandiflash AB of Uppsala applied for a permit to export three X-ray flash units of 1,200 kV each to India. These machines are a key resource in the development of nuclear weapons, but can also be used to develop conventional weapons. X-ray flash units are used to study rapid explosion processes.

(See NY TEKNIK 1986:18.)

Scandiflash AB claimed that the X-ray flash units in question would be used to study armor-piercing ammunition.

The application went first to the Nuclear Power Inspection Board (SKI), which turned down the request on the grounds that the X-ray flash units could go directly into the Indian nuclear weapons program.

After considering the matter for 1 year, the government has now turned down the export application. The primary reason given is that India has not signed the nonproliferation agreement.

Approval

All X-ray flash units that produce over 500 kV require governmental approval for export. That was decided in 1984. Before that time, the export of all types of X-ray flash units was completely unrestricted. For many years, Scandiflash has exported X-ray flash equipment to India, Pakistan, Israel, and South Africa. These are countries that already have or are extremely close to obtaining their own nuclear arsenals.

The export of X-ray flash units under 500 kV is still permitted.

Unsuccessful Attempt

Now the government is considering requiring export permits for these units, as well, since it has been found that even these "small" X-ray flash units can be used to develop nuclear weapons.

Scandiflash made a previous unsuccessful attempt to export the X-ray flash units in question to India.

At that time, the company attempted to use middlemen in England. The Swedish government allowed the equipment to be exported to England, but English authorities stopped the deal when it was discovered that it was the Indian military that was to be the final purchaser of the X-ray flash units.

First Sign

After NY TEKNIK exposed this affair, the British newspaper FINANCIAL TIMES wrote that this was the first sign since 1977 that India was working on a nuclear weapons program.

The first time it became perfectly clear that India had such a program was in 1974, when a test detonation was carried out. Even today, however, the official Indian description of that event is that it was a "nuclear explosion for peaceful purposes."

9336
CSO: 3698/675

WEST EUROPE/TECHNOLOGY TRANSFER

SWEDISH OFFICIAL ADVOCATES EQUIPPING SOVIET AUTO INDUSTRY

Stockholm DAGENS NYHETER in Swedish 26 Aug 86 p 17

[Article by Peter Sandberg]

[Text] The Soviet auto industry is now stepping up production. The two largest auto plants have both come out with new models, the first model changes since 1970. They are fuel-efficient, front-wheel driven, five-speed cars that the Soviets hope to export in large numbers.

About 20 years ago the Soviet auto industry changed its mode of operation. This meant that, in cooperation with Western auto companies, they began to construct entirely new auto plants, complete with car models and everything.

The largest investment was made in cooperation with Fiat and resulted in an enormous auto plant that produces 700,000 VAZ cars per year.

The Soviets also achieved some success on many export markets with their car, which was a copy of the Fiat of that time, but it was often sold at a lower price.

Model development then ceased and after a record year in 1978, exports have dropped by 40 percent.

Few Cars

"The new model of the VAZ was demonstrated last winter for the first time. It has also been shown in the West. The second largest model, the Moskvich, has not been shown publicly in the Soviet Union, but there are about 10 of these cars in existence. Today about 170,000 Moskvich cars are manufactured each year. This figure will drop to 160,000 when the new model goes into production. It is clear, however, that they hope to export these autos in large numbers," said Sweden's technical attache in Moscow, Per Olof Sjostedt, at a recent meeting of attaches in Goteborg.

He pointed out that, even though the Soviet Union is not a real automobile nation, the Soviet auto industry is fifth in the world statistically, after the United States, Japan, West Germany, and France.

The Soviets are placing their highest hopes in the VAZ Sputnik, which has a 48-kW engine, front-wheel drive, weighs 795 kg, and uses 0.59 liters per 10 km. It costs 8,000 rubles--3 years' wages.

Swedish Industry

The new Moskvich is a little larger and has a 56-kW engine. It will probably cost about 12,000 rubles.

"The Swedish industry should be able to step in as a subcontractor and help equip the auto industry, which is now placing a high priority on automation," said P. O. Sjostedt.

Both new models look like most of the cars now produced in the West and, consequently, should sell better than the present models, which seem somewhat outdated in both design and performance.

It should be added that there are also some other automobile models in the Soviet Union, such as the ZIL, in which top party officials and foreign heads of state on state visits ride. One of these cars weighs 3.8 tons, has a 315 horsepower V-8 engine, three-speed automatic transmission, etc. About 20 of these are manufactured each year and they would probably sell well on the Western luxury market, if anyone ever came up with the idea of exporting them.

9336
CSO: 3698/675

WEST EUROPE/TECHNOLOGY TRANSFER

FINNISH SUBMARINES TO USSR

Stockholm NY TEKNIK in Swedish 24 Jul 86 p 3

[Article: "Finnish Submarines to Soviet Union"]

[Text] The Finnish firm Valmet will build minisubs for the Soviet Union. The submarines will operate at depths as great as 300 meters and will be used primarily for research.

No submarines have been built in Finland since before World War II. According to the peace agreement between Finland and the Soviet Union, the Finnish navy cannot be equipped with submarines--at least not yet.

Finland is in the process of negotiating a change in the agreement, so that submarines would be allowed. The reason given by Finland for this is that the situation in the Baltic Sea now requires that the Finnish Navy procure submarines in order to protect more effectively Finland's extensive archipelago regions against unwanted intrusions. Similar changes in the peace agreement were previously made, for example before Finland purchased air-to-surface missiles from Sweden.

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CSO: 3698/679

EAST EUROPE/BIOTECHNOLOGY

GDR COMMENTARY ON CEMA BIOTECHNOLOGY DEVELOPMENTS

Magdeburg VOLKSSTIMME in German 25 Jul 86 (supplement) p 4

[Article by Kirill Djumajew, chairman, CEMA Permanent Commission on Biotechnology: "Fuel from Wastes--A Realizable Dream"]

[Text] Either 1 liter of bacterial suspension or 5,000 liters of donor blood are needed to produce the same amount of interferon or insulin. Equally crass distinctions can also be observed in respect to biotechnological processes in agriculture, industry or environmental protection. No wonder that biotechnology was included as one of five priority directions in the CEMA comprehensive program for scientific-technical research and was put on a par with microelectronics or machine construction.

Scientific forecasts suggest that in the next 8 to 10 years results can be anticipated in this sector which will help to substantially reduce the impact of unfavorable environmental factors on man and on agriculture. If there is success, for example, in preventing viral infections in farm crops, then, with the same technological outlay, yields will be 25 to 40 percent higher. New strains of nitrogen bacteria will not only make it possible to save mineral fertilizers, but will also effect on 20 to 30 percent increase in hectare yields in the case of legumes and grain.

Although the concept of biotechnology was limited at the beginning of this century to such old processes as baking bread, making cheese, winemaking, feed silaging and similar things, in recent times so-called physical-chemical biology has substantially expanded its limits. Biotechnology has become an efficient production sector.

Today in the CEMA countries, interferon and insulin, growth hormones, hundreds of antibiotics, vitamins, enzymes, many proteins and peptides are produced. Analyses confirm that in the immediate future 10 to 12 percent of organic raw materials can be produced using biotechnical processes. Among others these include millions of barrels of petroleum, substantial quantities of natural gas and many other substances which are important for the economy.

In the countries of the socialist community, biotechnology will make a decisive contribution to solving economic and social problems. The cattle industry can be cited as an example. Scientists in our countries are

concentrating their research on the production of feed additives and biologically active substances such as feed protein, amino acids, enzymes, vitamins, veterinary preparations and genetic engineering--to create new breeds of useful animals. Of significance is the development of genetic engineering methods for prophylaxis, diagnosis and therapy for the most widespread diseases of useful animals.

Plans call for eliminating the lack of feed protein in the CEMA countries which in animal production causes a deficiency of about 30 percent and consequently a 1.2 to 1.5 times increase in first costs. The addition of 1 kg of lysine per ton of mixed feed causes a 15 to 20 percent weight increase in cattle, reduces feed consumption and shortens the fattening period.

In applying biotechnical processes to utilize production and household wastes, to decrease the influence of so-called anthropogenic factors on the ecological balance the CEMA countries are confronted by large tasks. This is undoubtedly an acute problem. According to current information, the processing of organic wastes from agricultural production, of liquid and solid wastes from cities and wastes from the wood-utilizing and wood-processing industries into biogas makes it possible to produce about 100 million tons of standard fuel a year.

These are just some aspects of the cooperation between CEMA country scientists in biotechnology. The 5 main sections of the biotechnology program, however, contain 19 problems. Prerequesites for realizing the program are the initial and continued training of skilled workers, improvement in the flow of information among countries, also the establishment of data banks for microbe stains, tissue and cell cultures, and making biomachine and equipment construction uniform, standardized and specialized.

12124/13104
CSO: 2302/32

EAST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

NEW DEVELOPMENTS IN CSSR AUTOMOTIVE INDUSTRY

Warsaw MOTORYZACJA in Polish No 5, May 86 pp 109-111

[Article by Andrzej Nowosielski: "Czechoslovak Automotive Industry on the Threshold of the Eighth Five-Year-Plan Period (1986-1990)"]

[Text] Czechoslovak automotive industry, which by late 1985 consisted of 22 production factories and employed in combination with the support branches more than 150,000 people, plays a major part in CSSR engineering industry. The last (seventh) five-year-plan period (1980-1985) was of a major importance in the 20-year history of the automotive industry organized under the aegis of VHJ CAZ [not further identified].

This was observed not only in the dynamic growth of the major qualitative and quantitative indicators, but primarily in the expansion of the industry's creative potential and progress in the technological and organization sphere. In the technological sphere in 1980-1985, the concepts were developed, and recently the main production programs approved, for individual manufacturers and, in particular, for LiAZ, AVIA and CZM enterprises, as well as for the producers of automotive equipment who have attained significant growth of output, especially in the area of highly specialized products. The expansion and reconstruction of the TATRA factory has been completed, creating the conditions for full-scale production of the Tatra 815 motorcars.

The Automobile Factory at Trnawa (TAZ) underwent a further modernization, even though the output of Agro cars was reduced because of a lower demand. Expansion has continued at Bratislawa Automobile Factory (BAZ), where, among other things, new machining workshop and stamping press section have been built.

The products manufactured previously have been modernized, with a focus on increasing their longevity, improving reliability, raising quality, reducing the fuel consumption, limiting the toxicity of exhaust fumes, reducing noise and also improving the passive and active safety features.

Among important accomplishments, the following can be cited:

- introducing into production at LiAZ Enterprises new trucks of 110 type in several versions;

- introducing at TATRA Enterprises new Tatra 815 trucks;
- modernization of the Avia light passenger cars, including installation of five-gear gear box P202;
- annual modernization of Skoda-105/120 passenger car models and introduction of the new model Skoda 130 with five-gear gear box and a 1300 cm^3 engine;
- launch of the production of new models of Jawa 638 and CZ 472 motorcycles; and
- introduction in 1983-1984 of new types of Desta storage-battery trucks.

Altogether, 537 products have been modernized, or 75 percent of the total number of products manufactured by the automobile industry enterprises subordinated to VHJ CAZ. Between 1981 and 1985, 895,000 passenger cars, more than 230,000 trucks, 21,000 special-purpose trucks, 19,000 trailers, 16,000 buses, 784,000 motorcycles and 16,000 storage-battery trucks were built.

In addition, automobile equipment with a total worth of 20 billion korunas, spare parts with a total worth of above 20 billion korunas, tools and instruments worth 1.1 billion korunas and specialized machine tools and automatic production lines worth over 1 billion korunas were produced.

New technologically improved electrical and mechanical equipment has been installed in all modernized final models as a result of mass-scale production under purchased licenses for such units as compressors of truck engines, central spring clutches, aluminum fluid and lubricant radiators and brakes for passenger cars.

These results meant an overfulfillment of the total worth of planned output for the Seventh Five-Year-Plan period by 1.3 billion korunas. The industry has grown 24 percent as compared with the 1980 level.

Good results have also been achieved in exports to socialist countries; the growth here was dynamic and amounted to over 150.3 percent compared with the 1980 level; the growth of exports to capitalist countries exceeded 132.2 percent.

The Eighth Five Year Plan (1986-1990), begun in 1986, has posed before the Czechoslovak automobile industry new and extremely important targets, including the following:

- a definitive solution of the problem of completely meeting the demand for replacement components for trucks;
- preparing and launching in 1987 the output of new passenger car series S781 with front engine and front-wheel drive, initially in five-door version and later also in four-door, combination and coupe vehicles;
- improvements of technological and operational characteristics of Liaz trucks, especially those for international transportation;

- modernization of all types of Skoda 1203 and development of a new delivery truck based on the Skoda S781 assemblies;
- modernization of Avia light trucks increasing their engine power and improving consumer quality;
- developing for production a new articulated bus;
- modernization of tourist and sports motorcycle types of Jawa and CZ series and introduction of a motorcycle with a four-stroke engine; and
- continued modernization of automobile equipment, including carburetors, ignition systems, brakes, lighting, shock absorbers, etc.

In view of the major difficulties associated with these assignments and the complexity of the problems to be solved, the government of CSSR, by its edict 239/85 of 1 Jan 1986, created economic management organization for the automotive industry called Kombinat of the Automotive Industry. This organization has taken over the functions of VHJ CAZ, created in 1965.

The main purpose creating this integrated agency was to expand the manufacturers' powers and also their responsibility for the quality of the end product. Twenty-two factories manufacturing the end products have been combined into six specialized enterprises which meet most of the product needs of the automotive industry. Factories in automotive industry whose production programs are closely linked with the particular types of end products have been subordinated to the individual specialized enterprises as the main components of the new agency.

The following specialized enterprises have been created:

- Tatra Enterprises, with headquarters at Koprivnica, for the production of heavy-duty all-terrain trucks; subordinated factories are Banovce, Cadca and Trnava Automobile Factory;
- LiAZ Enterprises, with headquarters at Jablonec-on-Nysa, for the production of heavy road trucks, with subordinated factories at Karosa and Orlican;
- AVIA Enterprises, with headquarters at Prague, for manufacturing of light trucks, with subordinated enterprises at Prague, Brandys-on-Laba (mechanical workshop and foundry) and Trzyniec (metalworking plant);
- AZNP Enterprises, with headquarters at Mlada Boleslav, manufacturing passenger cars;
- CZM Enterprises, with headquarters at Strakonicy, producing motorcycles, with subordinated factories JAWA and Motor; and
- PAL Enterprises, with headquarters at Kromeryz, for the production of equipment for motor vehicles, with subordinated factories PAL at Prague, Motorpal at Jihlava, Autobrzdy at Jablonec-on-Nysa, Autopal at Novy Jicin, Jiskra at Tabor and Prazska Akumulatorka at Mlada Boleslav.

The above-listed specialized enterprises, as well as the Automobile Factory at Bratislawa, the motor engineering enterprises and the Institute of Research and Development of Motor Vehicles [UVMV] and the Automotive Industry Design and Development Institute [PIKAZ], will be subordinated directly to the general board of directors of the Kombinat.

The export and import of motor vehicles will remain the responsibility of the Motokov Foreign Trade Enterprises. The Kombinat board will develop and put into effect industrial policy for the automotive industry as a whole and undertake steps to improve the industry's overall efficiency.

The major objectives set before the specialized enterprises include the following: development, production and sales of end products, technical maintenance and repair services and production of spare components. The specialized enterprises will be headed by general directors.

It is expected that the new organization will give more independence to the specialized enterprises, effectively increasing the manufacturers' concern for the quality of their products and the economic effects of their productive activity.

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CSO: 2602/50

MACHINERY MINISTER DISCUSSES ROLE OF KEY TECHNOLOGIES

East Berlin STANDARDISIERUNG UND QUALITAET in German No 5, 1986 pp 122-123

[Interview with Dr Rudi Georgi, Minister for Machine Tool and Manufacturing Machine Construction, date, place, occasion not given]

[Text] [Question] The key technologies are characterizing direction and tempo of scientific-technical progress. What are the results in machine tool and manufacturing machine construction?

[Dr Georgi] The demanding goals, which were agreed on at the 11th Party Congress of the SED for the further development of our economy and thus for the consequent continuation of the main task of oneness of economic and social policies can only be achieved with widely effective key technologies. Effective utilization of microelectronics, computer technology and robotics, and other key technologies depends on the involvement of managers and the collective, on the qualifications, experience and creativity of all workers in the enterprises and collectives.

Starting with the responsibility for automation of the metal working industry, we have concentrated in the machine tool and manufacturing machine construction field primarily on the development of flexible automated manufacturing systems and we have achieved good results in this. Twelve such systems are now proving themselves in machine tool production, in the machine tool industry, in agricultural machinery and vehicle construction, in electric notor production and the hydraulic industry where they make work easier and increase productivity.

[Question] What is the utility of flexible manufacturing systems?

[Dr Georgi] I like to illustrate this with an example of the flexible system 1000, an internationally recognized top product from the machine tool combine "Fritz Heckert" Karl-Marx-Stadt. The system went operational a few days before the 11th Party Congress of the SED. Prismatic work pieces up to 1000 millimeter in size are manufactured. Computer aided subystems collaborete here--in mechanical processing, coloring, storage and transport with robots, and process control. Work productivity increased to 375 percent, linking of individual machines shortened parts throughput to roughly one tenth of present limits, since time consuming transportation or intermediate storage are eliminated. Two specialists at the FMS 1000 and one in the computer center supervise and control the installation. For them this is like an orchestra with highest timbre. One false note. and they immediately take control, having responsibility for millions worth of equipment. Man again appears

as main productive force. 45 coworkers, which till now were working in this building, took other jobs which were easier, more interesting and creative, than previous jobs in paint spraying, transportation or storage of work pieces.

The FMS 1000 is a piece of the future, an important step in the direction of highly automated manufacturing in the field of machine tool and manufacturing machine construction. This work was done not only by the Heckert workers, but also by collectives of the Research Center for Machine Tool Construction and by colleagues from the Technical University Karl-Marx-Stadt who all had a major part in this effort. Also considered were comments and presentations from future users. The FMS 1000 represents an exemplary solution which is both flexible and has many applications.

Scientific and research cooperation, partnership with users and suppliers, especially from the electrical and electronic industries, accelerate development and increase productivity. Another example is useful here. Collectives of the VEB gear cutting machinery plant MODUL Karl-Marx-Stadt and the Research Center for Machine Tool Construction and of the Technical University Karl-Marx-Stadt have cooperatively developed a high power gear hobbing machine which is equipped with microelectronics. Work productivity doubled, compared to the old type, the mass-output ratio improved by 30 percent. Use of microelectronics also permitted to reduce the number of parts from 2000 to 1000. As a result the manufacturer needed 44 percent fewer labor hours, 52 percent less rolled steel, and 49 percent less gray cast iron, compared to previous requirements. This is useful to everybody.

In order to accelerate production and technology development further, we will further expand research cooperation with scientific institutions.

[Question] Increased utilization of microelectronics requires, without doubt, building up one's own capabilities?

[Dr Georgi] This is a requirement. The share of products equipped with microelectronics of our sector will increase in the next few years from the present 65 percent to over 85 percent. The combines have prepared for that. Specialists, engineers, managers acquired the required knowledge, and qualified themselves. In accord with this, supported by such experts, we began to build up our own research and production basis. Through restructuring special facilities for production of microelectronic construction elements, building blocks and equipments were created. Efficient capabilities were created for design and construction of customer-specific circuits. Collectives in these enterprises and areas have today available vast experience for development and construction of specific microelectronic equipments, as for example in the VEB Textoma-Elektronik, Erfurt-electronic, and "Polygraph-Elektronik" WEGRA of the combines Textima, transformer technology "Herbert Warnke" and Polygraph "Werner Lambertz".

[Question] Included in this development is also the broad application of industrial robotics?

[Dr Georgi] Machine tool and production machinery manufacturers have since 1981 produced a total of 10,700 industrial robots, over 400 of them for their own use, Their use improved working conditions in the combines and enterprises materially and 10,600 colleagues could be freed for other demanding tasks, including internal development of rationalization tools. The 11th Party Congress of the SED decided, that until 1990 75,000 to 80,000 industrial robots should be built in our economy. The VEB machine tool combine "7 October" Berlin is the central developer and producer for flexible robot technology, the vital link for flexible automation, for the area of machine tools and manufacturing machinery construction. Specific solutions are being developed in house in all combines of our sector. Their application will be based on process analyses which will yield the greatest economic effects.

[Question] What are the next steps for utilization of key technologies in machine construction?

[Dr Georgi] The 11th Party Congress of the SED gave us clear directions. A primary objective is to combine the advantages of socialism better and better with the scientific-technical revolution. Machines controlled by microelectronics and mass utilization of robots permit us to see man as the master of production and the ruler of technology. This means that each step has to be prepared carefully and in tune with the workers, that workers have to be informed and qualified on a timely basis, and that creativity and enthusiasm for new things must be supported. Renewal of the own production must stimulate that of the other sectors. The share of automatically manufactured products will be tripled in our republic by 1990. Flexible automated manufacturing systems will be used to a greater extent to make them the basis for rational work.

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EAST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

CYCLOTRON LABORATORY IN HUNGARY

Budapest FIZIKAI SZEMLE in Hungarian, No 2, 86 p 80

[Article by Adam Kovach]

[Text] As a result of close to ten years of preparation and several years of strenuous work, our domestic arsenal of basic and applied nuclear research obtained a most significant addition. On November 15, 1985 ATOMKI's new acceleration laboratory, and in it Hungary's first cyclotron, was inaugurated.

It has been the consensus among industry experts for some time that it would be of the utmost importance to our domestic research to complement available facilities with the addition of an up-to-date cyclic accelerator, since that would provide opportunities which are qualitatively different and of wider applicability for both basic research and for applications. It became increasingly obvious that a cyclotron in Hungary would not only boost nuclear and atomic (basic) research, but would also signify important advances and would result in improved possibilities in many areas of application, e.g. industrial quality control, medical diagnostics and therapy, botanical improvement, etc. An increasing demand for short half-life positron radiation isotopes also indicated the need for the installation of a cyclotron. This view was further supported by experiences reviewed and information disseminated at the conference held just ten years ago, in August of 1975, in Debrecen, for the investigation of interdisciplinary exploitation possibilities of cyclotrons.

It was obvious from the start that although, at least in theory, our domestic scientific and technological background would have sufficed to build a cyclotron, it would have placed a considerable burden on the majority of our scientific and technological talent, adversely influencing their successes in other fields of endeavor. Under such circumstances, the only reasonable alternative was to purchase a cyclotron, even if it involved considerable financial commitments. In the selection of the type of cyclotron to acquire, we were handicapped from the start by the limited number of types available on the open market, and by insufficient funds at our disposal and thus, practically, the only one we could consider was the 103 cm pole diameter MGC type "compact" cyclotron made by the "D.V. Yefremov" Electro-Physical Institute of Leningrad which, in spite of its small dimensions, has various advantages for intended applications.

After several years of preparation, the Scientific Policy Committee accepted the April 1978 recommendation of the Hungarian Academy of Sciences, the National Technical Development Committee and the National Atomic Energy Committee for the creation of a cyclotron laboratory under the aegis of ATOMKI, and we were able to go ahead with the project, which turned out to be the largest investment under the 6th five-year-plan. Within the scope of its technical assistance program, the International Atomic Energy Commission, too, lent considerable financial support to our nearly 300 million forints worth of capital investment.

Based on the investment program approved in 1979, planning began in 1980 and laboratory construction was started in 1982. Building design was furnished by the East Hungarian Planning Enterprise and general contractors were the State Construction Enterprise of Hajdu County. Both planning and construction represented special tasks for the experts who had to solve a number of problems in creating optimal conditions and, at the same time, meeting radiation protection requirements. For example, construction of extraordinarily thick monolithic concrete walls and floors never before built in Hungary, necessitated the development of special concrete technology.

The cyclotron, which is the central element in the new laboratory is one of the smallest in size in the world, but its advantages (which were proved in practice in the course of jobs performed on similar installations in Finland and the USSR) allow for great versatility in application. We have summarized the cyclotron's major beam data in the table below:

Beam Data of the MGC Cyclotron

Accelerated ion	H^+	$_2H^+$	$_3He^{++}$	$_4He^{++}$
Energy (MeV)				
input beam	2-20	1-10	4-26	2-20
output beam	5-18	3-10	8-24	6-20
Max. intensity (UA)				
input beam	200	300	50	50
output beam	50	50	25	25
Energy dispersion		0.3%		

Major advantages of the MGC cyclotron (beside relatively low max. energy) are a wide range of beam energy variability and high beam intensity, which open up a relatively wide array of application possibilities for our domestic research (not only for the scientists of ATOMKI, but also for all institutions in need of the new laboratory's research facilities. According to the program drawn up during the preparatory stage, about one third of research work planned will involve basic research in the fields of nuclear and atomic physics. A similar proportion will be devoted to industrial and environmental research activities involving nuclear analysis. A considerable proportion of the laboratory program will be aimed at the production of short half-life, positron emission isotopes--mostly for medical purposes--for which, of course, a PET (positron emission tomograph) is indispensable. The target stations, beam conduction system and measuring center of the cyclotron have been designed to

conform to the varying requirements and different needs inherent in the planned multi-purpose application, and so have the cyclotron's collateral laboratory units (radio-chemistry laboratories, separate hospital wing to assure proper patient care in cases of medical treatment administrable on the premises only etc.)

Over and above an evaluation of our possibilities, aims and requirements, carried out at several conferences, scientific seminars and meetings (some on an international level), we made sure that we have at our disposal at the outset a concrete scientific program which will allow us to effectively exploit the possibilities afforded by the new laboratory from the start. We felt that most suitable for the purpose, was the project system which, in essence, requires that any scientist who or institution which wants to use the cyclotron, must submit a written proposal of the research they wish to conduct, together with a summary of the anticipated results, specifying any other conditions necessary to accomplish the purpose of the project. The projects will be discussed at the Nuclear Research Institute (ATOMKI) in plenary session and a decision regarding acceptance and scheduling will be rendered by the Cyclotron Committee, especially formed for this purpose. We have devoted particular attention to the so-called initial-stage projects, i.e. planned research projects which, based on available collateral conditions, can be accomplished as soon as the beam is available. Such projects proposed by Nuclear Research Institute scientists as well as by other institutions (Central Research Institute of Physics, Isotope Institute, Lajos Kossuth University of Sciences Experimental Physics Faculty) are ready to get started. We are convinced that their success will fully justify the decision which enabled us to create the cyclotron laboratory.

On the occasion of the laboratory's official opening, in the presence of the President and Secretary General of the Hungarian Academy of Sciences, the representatives of the Permanent Committee for Applied Atomic Energy of the International Atomic Energy Agency and the Soviet Union as well as many invited guests, Lenard Pal, Secretary of the Hungarian Socialist Workers' Party and regular member of the Hungarian Academy of Sciences, inaugurated our country's first cyclotron laboratory.

Aladar Valek, Science Department Head of the Nuclear Research Institute at the Hungarian Academy of Sciences received the Order of Work, golden class, from the Presidential Council of the Hungarian Peoples Republic in recognition of his expert organizational and managerial activities in connection with the completion of our country's first cyclotron laboratory. Five additional persons working for the institute or the construction enterprise received the decoration "For Outstanding Work".

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